ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E.
Technical Editor: W. O. FENWICK, M.I.E.E.
Industrial Editor: J. H. COSENS

3rd December, 1948

Contents

EDITORIAL—
Background Knowledge 849

ARTICLES—
Making Ice-Cream 851
Circuit Interruption. By R. W. J. Cockram, A.M.I.E.E., A.I.Mech.E. . 856
Fabricated Motors 867
Tobacco Growing 869
Canadian Electrical Industry. By E. Victor Manser 871
All-Electric Flats 877
Magnetic Amplifier 880
German Patent Developments. By S. T. Madely 886

REPORTS—
Load-Spreading Plans 854
Manchester District Heating . . . 854
Ship Welding 860

REPORTS—*continued*—
Electricity Supply Failures . . . 866
New E.D.A. Film 866
B.E.A. Contracts 870

NEWS SECTIONS—
Personal and Social, 863; Parliamentary, 870; Commerce and Industry, 873; Electricity Supply, 879; Financial, 881; Contracts, 889

VIEWS ON THE NEWS . . . 855
CORRESPONDENCE 861
NEXT WEEK'S EVENTS . . . 885
NEW PATENTS 887
Classified Advertisements 61
Index to Advertisers 78

EDITORIAL, ADVERTISING & PUBLISHING OFFICES: Dorset House, Stamford St., London, S.E.1.
Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No.: Waterloo 3333 (60 lines).
Annual Subscription: Great Britain and elsewhere £3 0s. 0d. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, and crossed "Lloyds Bank." Entered as Second Class Matter at the New York, U.S.A., Post Office.

K Kidde

Fire Protection

The Kidde System is the most modern method of stopping fires. It goes into action on the temperature rising and, because the extinguishing agent is a dry gas, it harms nothing and can be used safely against outbreaks in Electrical Plant.

Full particulars from:—

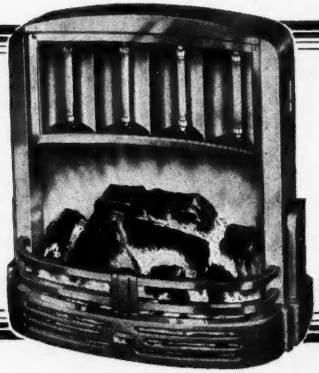
The WALTER KIDDE CO., LTD.
Belvue Road. NORTHOLT. Middsx. WAXlow 1061

INTRODUCING THE

Masterberry

Equipped with the new All Round Heating

"Model 444 Masterberry in Warm Silver" — a striking modern design and a new finish. Interesting feature is the curved element assembly which ensures a very wide angle of heat radiation.



Four 500 W. elements on two switches.

Berry's ELECTRIC LTD

Touchbutton House, Newman St., London, W.1.

FUEL SAVING—FOR THE STEAM-RAISER

May we send ***Leaflet 751-X?***

This portable outfit checks the efficiency of steam-raising by measuring the CO_2 percentage and the temperature in the flue gases, enabling the heat lost up the chimney to be determined. Steps can then be taken to reduce wastage and secure maximum efficiency.

CAMBRIDGE INSTRUMENT COMPANY LIMITED

WORKS: LONDON & CAMBRIDGE

ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER

ESTABLISHED 1872

Vol. CXLIII. No. 3706

3rd DECEMBER, 1948

Background Knowledge

ENGINEERS AND THEIR FELLOW MEN

SPECIALIZATION too early in a professional career is, in its effect of arresting development, comparable with premature standardization of manufactured products. This applies especially to electrical engineering, in which rapidity of progress demands a high degree of adaptability to new ideas. On the other hand the necessity for specialization increases in order that the growing magnitude of scientific knowledge may be put to practical use.

Interchange of Views

Over fifty kinds of electrical engineer are known to the Ministry of Labour and a glance through a half-yearly index of this journal reveals many more semi-specialized branches. Too often the progress made in any one of them is imperfectly known to the others, to the detriment of their own work. To help in preventing segregation in watertight compartments is an important duty owed by the technical Press to the industry of which it is a part. Recognition of this danger is also implicit in the organization of the Institution of Electrical Engineers, which in its ordinary meetings, joint meetings with kindred societies and social functions, has created a means for co-ordinating the activities of specialized sections and relating these to the whole.

Nevertheless, such a framework, more or less confined to a scientific outlook, does not go nearly far enough. It has been said that he who is an engineer only is less than an engineer, but engineers are not engineers only nor for all of their time—a point to which Mr. T. G. N. Haldane drew attention in his presidential address to the Institution in October. Emphasizing the need for engineers to work out a general philosophy of life, Mr. Haldane pointed out that ideas in the mental background are those that govern behaviour. As members of a society, the character of which they can help to form and in this way alone can influence the manner in which their own contributions to its welfare are used, engineers should be able to "speak the same language" as those trained in other ways of thought.

"Extra-Mural" Reading

Much of the common bond of general knowledge comes too early in general education to be readily assimilated and hardly survives the rigours of a scientific and technical course of study. Clearly a study in class of "the humanities"—whether as a refresher or a kind suitable for more mature intelligence—cannot be embodied in the already overcrowded curriculum. A suggestion made by Mr. Haldane at the I.E.E. Mersey and North Wales Centre dinner last month indicates a form of approach to the problem that could make its influence felt in leavening the lump. Teachers can bring the subject to the notice of their students and give them some guidance, leaving it to them to follow it up. Most of these read for recreation occasionally and in many instances they would derive, perhaps to their surprise, more satisfac-

tion from books of the kind referred to by the President than from those having only a temporary value.

For readers who doubt their ability to be easily interested in what might appear to be abstract ideas, there is another incentive to follow the presidential advice. That is the beneficial effect of an activity that encourages mental flexibility. The broader outlook gained in this way should give its possessor greater confidence in coping with problems arising out of the continual introduction of new methods or the expansion of existing ones, more especially when the amount of scientific knowledge available threatens to outstrip ability to make it serve a useful purpose.

MARSHALL AID

DETAILS of the assistance being received by Great Britain under the European Recovery Programme appear to be unobtainable. The last-quoted figure (for the six months to March next) is over $95 million worth of machinery, including turbines, generators and motors. A Washington report dated 23rd November gave the value of the "aid" received by this country since the Economic Co-operative Administration began operations as over $1,200 million; of this American electrical apparatus was said to account for $636,000 and Canadian apparatus for $151,000. Board of Trade figures for the first ten months of this year show imports of American electrical equipment at £877,000 (against £868,000 in 1947) and those of Canadian electrical apparatus at £351,000 (against £506,000). These figures include "Marshall aid."

SCREW THREADS

THE declaration of accord with respect to Anglo-American-Canadian unification of screw threads, signed in Washington at a conference attended by a delegation of four B.S.I. representatives, is the culmination of discussions which started forty years ago. Agreement has been reached with regard to sizes of ¼in and above. Smaller sizes are to be the subject of further discussions, for British engineers will find it difficult to believe that it is really necessary to establish two series of smaller sizes so close together as has been proposed by the United States. Meanwhile the partial standardization already agreed to is an important step towards practical inter-nation co-operation. The adoption of the new system by the three participating countries and probably others in the Commonwealth should save a great deal of time and money and assist interchangeability.

OVERSEAS REPRESENTATION

IT is complained by the Export Promotion Department that too often firms who ask our commercial diplomatic representatives overseas to find likely agents for their products give too little information. It is suggested that on such occasions the firms requiring assistance should send about half a dozen catalogues and price lists to the officers concerned, and, if possible, some samples of their products. Some concerns who may be very well known in their own industries often forget that commercial diplomatic officers cannot be acquainted with the make-up of all industries and must be well "briefed" in each individual case.

IDEAS WANTED

IN this issue we publish an appeal by Mr. L. C. Sharp, chairman of the Court of the Electrical Industries Benevolent Association, for suggestions from readers of means of raising funds for the Association. Already several regular annual events are organized with successful results, but there is plenty of the year left for other fund-raising arrangements. The need is urgent—a deficit of £10,000 is feared this year—and so we ask readers to come to the Association's aid.

PLANT FAILURES

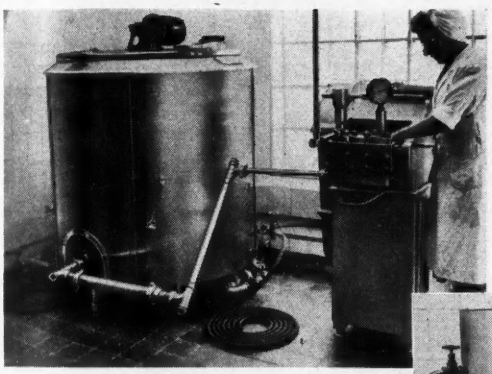
IN estimating plant capacity that will be available to meet maximum demands without load shedding at some continually receding date, little allowance seems to be made for such mishaps as those that have recently afflicted Dunston "B" power station. Yet the history of electricity supply shows that the chance of double failures cannot be ruled out of account and that reliance cannot be placed on a repetition of the circumstances at Dunston, which, as mentioned on page 866, have mitigated the trouble by enabling an operation something like "cannibalization" to be performed.

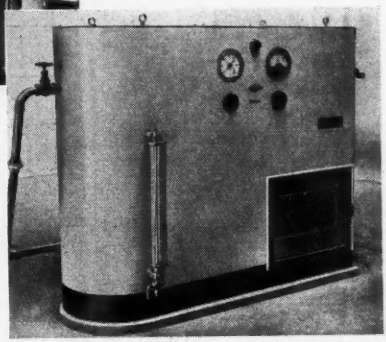
Making Ice-Cream

ALL-ELECTRIC INSTALLATION AT SOUTHEND-ON-SEA

PROBABLY the most completely electrically equipped ice-cream factory in the country has recently been completed at the Crescent Creameries, 205, Southchurch Road, Southend-on-Sea. It is designed for a normal output of 1,000 gal of ice-cream per day, but the plant is of sufficient capacity to handle a considerably larger quantity if required.

From the arrival of the raw materials to the storing of the finished product the use of electricity as the sole source of power and heating greatly facilitates the provision of those highly hygienic conditions so desirable when dealing with foodstuffs such as ice-cream. Manual handling has been practically eliminated, and further contemplated minor improvements will dispense with most of the few hand operations still remaining.





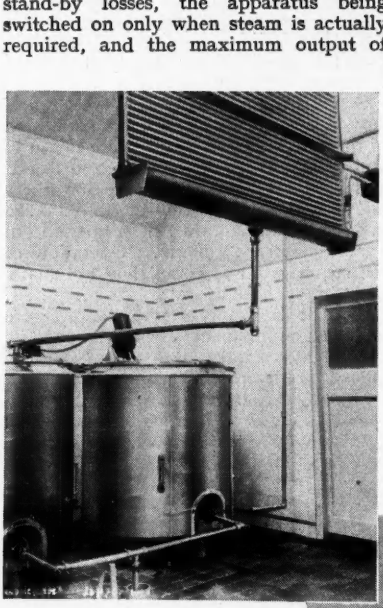
(Above) The ingredients are first treated in a pasteurizing tank and then passed on to the homogenizer. (Right) Thi "Autolec" 150-kW electrode steam raiser provides an almost instantaneous supply of steam for process work throughout the factory

The raw materials are unloaded in the receiving department on the first floor with the aid of a 6-cwt travelling hoist supplied by T.B.T. Electric Co., Ltd., and are stored in bins. After careful weighing to produce a well-balanced mix they are put into a 200-gal stainless-steel pasteurizing tank previously half-filled with softened cold water.

Steam from a 150-kW G.W.B. "Autolec" electric steam raiser is then admitted to the tank and the temperature raised in approximately 45 minutes to 190 deg F and held at that temperature for thirty minutes, thus completing the initial stage of mix manufacture in a period of approximately 1¾ hours. Operation of the steam raiser is completely automatic and foolproof, no operator being required. A pointer is simply set to the pressure of steam required and then in about five minutes the steam is delivered, a pressure switch controlling a magnetic valve which automatically adjusts the water level, and proportionately the load, thus giving a constant pressure. This pressure maintains instantaneous control of the valve within 1 lb of the pressure setting.

A hand-operated steam valve is fitted to the steam main to adjust the demand during operation. The boiler rating is proportionate to the resistance of the water path, and the whole operation is regulated by the automatic control of the water-level. The current passing between the electrodes is, therefore, regulated for the required output of steam, which is in

direct proportion to the electrical consumption. There are, of course, no stand-by losses, the apparatus being switched on only when steam is actually required, and the maximum output of steam is obtained within about eight minutes, starting from cold. An overall efficiency of 97 to 98 per cent is said to be obtained.



(Above) Leaving the homogenizer the mix passes through a cooler and is then retained in water cooled storage tanks until required. (Right) From the storage tanks the mix is frozen in this 60-gal-an-hour continuous freezer

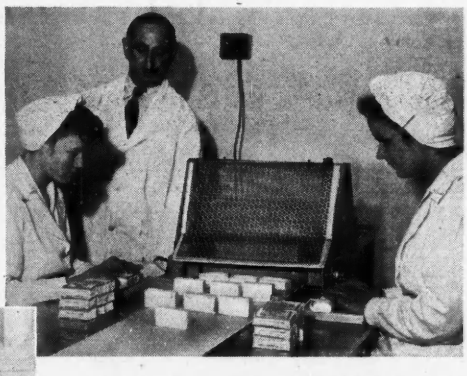
While being treated in the pasteurizing tank the mix is kept moving by means of a ½-h.p., 1,425-r.p.m. B.T.H. motor. The heat treatment completed, the mix passes through two filters and is pumped by a 7-h.p. 200-gal-per-hour pump to a pressure of 2,000 lb per sq in through a homogenizing valve. This process of homogenization ensures that all the fatty globules are broken down to minute particles, completely and permanently dispersing these fatty particles amongst the other ingredients, ensuring that no separation can afterwards take place and assisting to give the finished product a soft creamy consistency. When it leaves the homogenizer the mix has a temperature of about 160 deg F. It is then passed over a cooler, the top part of which is water cooled and the bottom half brine cooled.

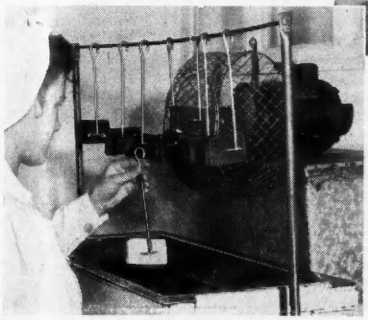
Now, at a temperature of 40 deg F, the mix flows into two 200-gal water-jacketed storage tanks where it is kept, constantly agitated, at 35 deg F until required. The water in the jackets of these tanks is refrigerated by means of two G. & J. Weir compressors driven by ½-h.p. Electrical Equipment Co. (Leicester), motors. The tanks are arranged in tandem so that it is possible readily to transfer cream from one to the other. Allen West and "Auto Memota" motor starting gear is employed.

Gravity fed from the storage tanks to the floor below, the mix is passed through two 60-gal-per-hour continuous freezers (7-h.p. motor) operating at −20 deg F. A ½-h.p. constant-speed motor with variable-speed gear drives three pumps, one admitting the mix to the freezing cylinder, the second metering the frozen ice-cream from the cylinder and the third pumping filtered air into the freezing cylinder. The freezing chamber is of 4-gal capacity and the cream in constant flow remains inside for two minutes under an air pressure varying between 15 and

30 lb per sq in, dependent upon the nature of the mix and the desired weight of the finished product.

As the ice-cream leaves the freezer (at a temperature of 22 deg F) it is fed into cans or moulds, which then go to the hardening room. Here the temperature is maintained at −15 deg to −20 deg F. When the ice-cream is set hard the moulds are slightly thawed and the slab of ice-cream



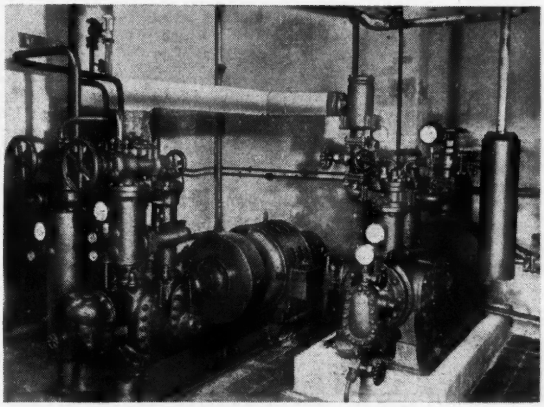


(Above) A conveyer is used to facilitate packing (Left) After dipping in an electrically heated bath, chocolate-coated ices are dried by an electric fan

turned out on to a conveyor belt driven by a ⅓-h.p. motor. A cutting machine cuts the slabs up into "brickettes" and operators wrap them manually. The use of an automatic wrapping machine is under consideration. The wrapped brickettes are packed in packets of two dozen and stored in cold room at temperature of −5 deg F until required.

Normally the ices are sold in cartons or brickettes half strawberry and half vanilla. For chocolate-coated ices the brickettes are dipped by means of stainless-steel forks into a bowl of chocolate electrically heated to 110 deg F. They are then passed in front of a ⅛-h.p. electric fan which immediately dries the chocolate. Mr. C. W. Curtis, a director of the company, states that hand chocolate dipping is considered a very obsolete method in the trade, but he is of the opinion that it is quite as fast as present-day mechanical chocolate dipping machines. The company is, therefore, continuing with the hand method until it can obtain a chocolate enrober suitable for dealing with 400 dozen "choc ices" per hour.

Serving the cold rooms are two compressors arranged in tandem. One, a Sterne machine driven by a 12-h.p. motor, is equipped with Igranic control for completely automatic operation. Manual control of the other compressor, a Haslam unit driven by a 20-h.p. motor,



The ammonia compressor plant for the cold room

is effected by means of Morecambe Electrical Co.'s switchgear. Two Worthington Simpson water pumps (1½-h.p. motors) are used for recirculating the cooling water from the ammonia condensers over a natural draught cooling tower.

All the cans and other utensils employed are thoroughly sterilized. After first washing in electrically steam-heated water troughs, they spend twenty minutes in a Nathan steam sterilizer. The atmosphere throughout the building is kept pure and odourless with the aid of an Ozonair plant.

The installation was carried out by the Crescent Creamery Co., Ltd., employees under the supervision of Messrs. Alfred Porter & Co. (London), Messrs. David Davis, Westcliff-on-Sea, undertaking the electrical work. The ice-cream-making plant is of the Creamery Package Manufacturing Co.'s manufacture, supplied through their authorized agents, Messrs. Alfred Porter & Company (London). The electricity supply is provided by the Eastern Electricity Board, Essex (No. 3), Sub-Area under the supervision of Mr. R. C. Golding, senior executive officer for Southend-on-Sea.

Load-Spreading Plans

Penalties for Non-Compliance

DETAILS of plans for load-spreading during December, January and February were announced on Monday by the London & South-Eastern Regional Board for Industry. Emphasizing that the need for reducing the peak load was just as great as it was last winter, Mr. E. J. Taylor, chairman of the Electricity Sub-Committee, said that the Board was asking industry to reduce its load by 20 per cent between 7 a.m. and 7 p.m., while commerce was asked to limit itself to 50 per cent of its installed capacity during those hours. The national peak hours were from 8 a.m. to noon and from 4 to 5.30 p.m., and it was necessary to extend the hours in this Region because of the circumstances of industry and commerce.

It was urgent that all plans for lowering peak consumption should be put fully into operation by 1st December and while it was hoped that firms would co-operate voluntarily the Government had powers under Defence Regulation 55 (2A) to secure the imposition of penalties of £500 or one year's imprisonment on persons who did not comply with directions made. If need be maximum demand indicators would be used to check the consumption of commercial establishments suspected of exceeding their permitted load. Mr. Taylor emphasized that load-spreading was essential to safeguard the country's recovery programme and that under the scheme outlined industry should be somewhat better off this winter than last in the matter of electricity supplies. He said that the position would be reviewed in February.

Referring to ways in which domestic consumers could assist in avoiding power cuts, Mr. R. Cross, director of information, Ministry of Fuel & Power, pointed out that, although the economy appeal was related to a five-day week, it would help considerably if as little electricity as possible was used at the week-ends, too, as it was then that repairs of generating plant had to be done. Mr. J. G. Bentley, representing the British Electricity Authority, said that already since the beginning of October load shedding had been necessary twenty-six times on nineteen days. The average length of the shedding had been about 45 minutes and the average amount of the load shed just over 5 per cent, the most being 12 per cent.

Manchester District Heating

Discussions with B.E.A.

REPRESENTATIVES of the British Electricity Authority and the North Western Electricity Board met representatives of the Manchester Corporation last week to discuss questions which had arisen over the terms on which the British Electricity Authority might take from the Manchester Corporation the by-product electricity which would be produced if the Manchester Corporation proceeded with the district heating scheme for a large part of the Wythenshawe Estate. (See *Electrical Review*, 19th November, p. 775.)

The discussions covered both the economic and social aspects of the scheme, and are said to have been "most candid and exhaustive." The British Electricity Authority agreed that the most helpful course it could take would be to give consideration once again to all the details of the scheme in full consultation with experts nominated by the Corporation, in order that a statement might be prepared of the most advantageous terms which it could offer on a commercial basis. As soon as this has been done a further meeting will be arranged, and it is hoped that this will take place within the next two or three weeks.

Views on the News

By REFLECTOR

As an advocate of electric water heating, as the most efficient method of securing hot water, I am in complete sympathy with the Electrical Development Association in its persistent endeavour to convert the Chancellor of the Exchequer to the same view. When the purchase tax on electric water heaters was raised to 100 per cent the reason given was that they added to the peak load. This assumption that the heaters were in use only between certain hours is easily refuted, but the Chancellor has not yet been convinced. But he has promised the Association that the matter will be considered again upon the next review of the tax. Meanwhile the gas water heaters continue to enjoy the preferential rate of 66⅔ per cent, which is inequitable and suspiciously like a deliberate policy.

★ ★ ★

I wonder if it is generally appreciated what effect the limitation of supplies and the 100 per cent purchase tax are having on the manufacturers of electric water-heating appliances? When I visited the works of a well-known firm recently I was shown stacks of finished products representing, I was told, no less than £300,000 in value. In neither the home market nor abroad (where there is at present a very limited market owing to import and other restrictions) is there any immediate hope of disposing of an appreciable quantity of this apparatus, although there is no doubt as to the popular demand for electric water heating.

★ ★ ★

It was complained at a recent meeting of the Swansea Watch Committee that young constables were being enticed from the police force by the better wages which they could obtain in other walks of life. The case was mentioned of one who had secured a position of wayleave officer with an Electricity Board at a salary of £500 a year. Thereupon a member of the Committee said that this was "virtually one Government Department poaching from another," and there ought to be some liaison between departments to prevent it. Any attempt of this sort would be iniquitous I consider; it would cramp initiative and the natural desire of men to better themselves. If it is desired to secure and retain good men, conditions and wages comparable with those which tend to tempt them away from their jobs must be offered.

★ ★ ★

At a Press showing of the new E.D.A. film, "Men of Merit," we were asked to regard it from the public's point of view as though it was necessary to lower our standard of criticism. In point of fact, this adjustment of values was not really needed for the film passes on its merits as an ingenious piece of work adapted to all mental ages. I was particularly amused at some of the rather ruthless rhymes employed by the Professor in his lantern lecture. The exhibition of the film in about 3,000 cinemas should result in keeping many thousands of appliances off the peak.

★ ★ ★

The American electricians paid at a rate of about £2,240 per annum, to whom I made reference last week, are overshadowed by the British miner who told a Court that in the year ended April, 1947, he earned a total of £2,676. More than that, he also said he had earned bigger wages in his time. This sort of thing is liable to make members of the National Coal Board dissatisfied with their "surface" jobs.

★ ★ ★

I am always interested to see the *Electrical Review* Information Department at work. Dealing with 15,000 inquiries a year it goes to an extraordinary amount of trouble to give reliable information and rarely has to admit defeat. Though generally a matter of routine, the work has its brighter moments, and when I last looked in someone had just asked for the name of manufacturers of "snatch" plugs as used in fire stations for engine heaters. Not knowing the answer, a member of the staff rang up a fire station to be told that no special plugs were used there and that it had been known for firemen, in their excitement, to attempt to remove the plug while driving off, pulling down part of the ceiling.

Circuit Interruption

ARC CONTROL DEVICES

By R. W. J. COCKRAM,
A.M.I.E.E., A.I.Mech.E.

IF the potential difference between two electrical contacts in juxtaposition is raised beyond the dielectric strength of the surrounding medium, dielectric breakdown occurs and current flows from one contact to the other as an arc. The potential difference between the contacts may have to be considerably reduced or, conversely, for constant potential difference, the distance between them may have to be increased before the arc is extinguished.

The arc may be considered as composed of a stream of extremely small particles or ions of metal torn from the cathode, or positive electrode, and attracted to the anode or negative electrode, thus forming a current-carrying conductor of negligible mass. Such an analogy is not, however, strictly true, since charges of similar polarity, like similar magnetic poles, repel each other and as the arc is formed of ions of similar polarity, which are actually small charges, these repel one another, thereby ionizing the surrounding medium. This lateral spread of the arc can, on heavy faults, ionize a considerable amount of the surrounding medium, thereby increasing the possibility of earth faults with neighbouring conductors (Fig. 1).

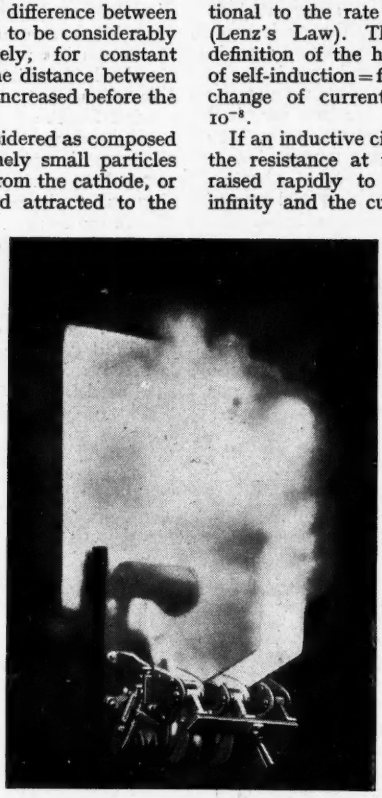


Fig. 1.—View of air circuit breaker clearing large fault current at 400 V, showing lateral spread of arc

With d.c., however, other conditions influence the magnitude of the arc. Most electrical circuits inductively store electrical energy which is automatically fed back immediately the current tends to be reduced. This energy is expressed as $\frac{1}{2}L.I^2$, where L is the inductance in henrys and I the current in ampères. The feed back takes the form of an induced voltage which is proportional to the rate of change of current (Lenz's Law). This follows from the definition of the henry as the coefficient of self-induction = flux set up by 1 ampère change of current × number of turns × 10^{-8}.

If an inductive circuit is opened quickly the resistance at the point of break is raised rapidly to a value approaching infinity and the current thereby reduced to zero. The induced voltage across the contacts may then be many times greater than the normal supply voltage. Upon the arc being struck, however, the resistance of the circuit falls to very nearly its value before the opening of the circuit. The arc is then maintained by the normal circuit voltage until the widening contact gap raises the arc-path resistance to such a value that the supply voltage can no longer maintain the arc. In this stage the resistance of the circuit is comparatively slowly increased, whereby the induced voltage is kept small.

Finally, upon arc extinction, a further momentary surge voltage is induced which is usually indicated in the minor explosion which then occurs. With d.c., therefore, contact breaking must be

accelerated so as to minimize the arcing period, thereby restricting the duration of contact dissipation by the volatization of the contact material.

Turning to a.c. contact breaking, when the resistance of the circuit has momentarily been increased to a theoretically infinite value, there is also inductive effect. Now much depends, however, upon the point of the voltage wave at which the break takes place and the natural frequency of the circuit interrupted.

The case of low natural frequency circuits has been discussed by the writer in a previous article. ("Circuit Interruption," *Electrical Review*, 6th September, 1946.) Where, however, values of inductance and capacitance are such as to give high natural frequency values, and the power of the circuit involves high current values, the opening of the a.c. circuit results in hardly predeterminable transient wave forms as exemplified in the oscillogram in Fig. 2. This shows that the first peak of this transient is the most dangerous, that the general wave form is re-established during the arcing period and that the amplitude lessens with the increased resistance of the arc gap.

Because of this, many forms of large interrupting gear do not rupture the arc during the first cycle after contact separation, and generally some three to ten cycles elapse before the arc is finally extinguished. On low-power comparatively low-inductive circuits up to 25 kW, however, the transient is not so pronounced and d.c. breaking conditions are usually employed.

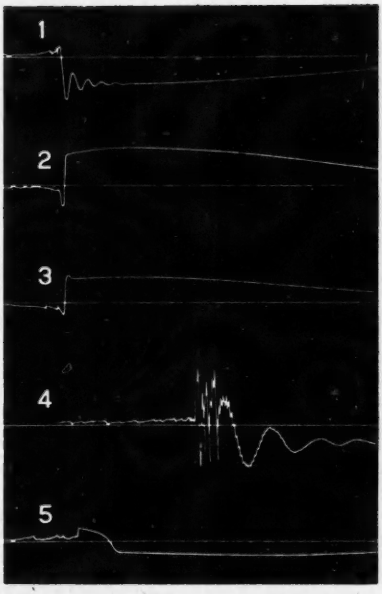


Fig. 2.—Curve 1.—Inherent re-striking voltage and oscillation when interrupting heavy short circuit. Curve 2.—Damping effect of "Metrosil" on similar test. Curve 3.—Reduced damping effect at two-thirds of voltage in Curve 2. Curve 4.—Violent oscillations when interrupting small inductive currents. Curve 5.—Critical damping of oscillations in Curve 4 with "Metrosil" re-inserted

Owing to the alternating voltage the a.c. circuit usually requires only a fraction of the inductance of its d.c. counterpart to perform its function. A further reason for lower values of inductance in a.c. circuits is the supply frequency, for if the value of inductance is allowed to become large a considerable amount of wattless power is then absorbed by the circuit, with resultant inefficiency of both the circuit concerned and, to a lesser degree, of all associated circuits which are connected to the supply.

In the d.c. case, however, very high values of inductance must sometimes be employed as, for example, in the field excitation of generators and in lifting magnets. Usually these provide inherent means of absorbing the stored energy on disconnection, e.g., the armature circuit of a shunt - connected motor or generator provides a discharge path for the highly inductive field circuit.

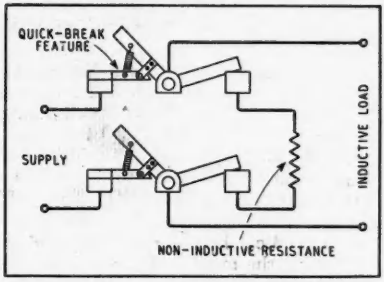


Fig. 3.—Discharge resistance circuits for large lifting magnets

Where, however, this path is not provided, it must be included in the interrupting gear as in Fig. 3, which shows a standard discharge resistance circuit for a large lifting magnet. Such means, however, do not eliminate arcing, but merely reduce the current in the inductive circuit before it is opened. The connection of a resistance across the terminals to by-pass the stored energy was one of the earliest methods and is still frequently employed, being similar in function to the latest methods.

In one of the two main forms of arc control the arc is extended to an unstable length and breaks down due to its volatile characteristics; in the other the stored energy of the circuit which will form the arc is by-passed to reduce or eliminate arcing.

The conducting properties of the arc have been previously mentioned. Since this "conductor" is carrying current, it may be acted upon by magnetic forces, and this property is largely employed in arc extinction, as in the magnetic blow-out coil fitted to contactors. This device, comparatively cheap to manufacture, comprises a series coil arranged above the separating contacts (Fig. 4). Its action depends on the interaction between the fields set up by the current flowing in the arc and by the coil whereby the arc is forced upward (Fleming's left-hand rule). Fig. 4(a) shows how the interlinkage of these fields forces the arc upward irrespective of the direction of current flow. These conditions, however, occur only in series-connected blowout coils, wherein once the relationship between the blow-out coil and the contacts has been mechanically established it remains for either direction of current.

Reversal of direction of the current in the blowout coil can be attained only by reversal of current in the arc, the form of mechanical reaction being unaltered. In this it is analogous to the reversal of supply to the main terminals of a shunt motor where the direction of current in the field or the armature is changed so as to reverse the direction of rotation. With shunt-connected blowout coils these conditions no longer apply and each coil must be tested to ensure that it blows the arc upwards, since the polarity of the core

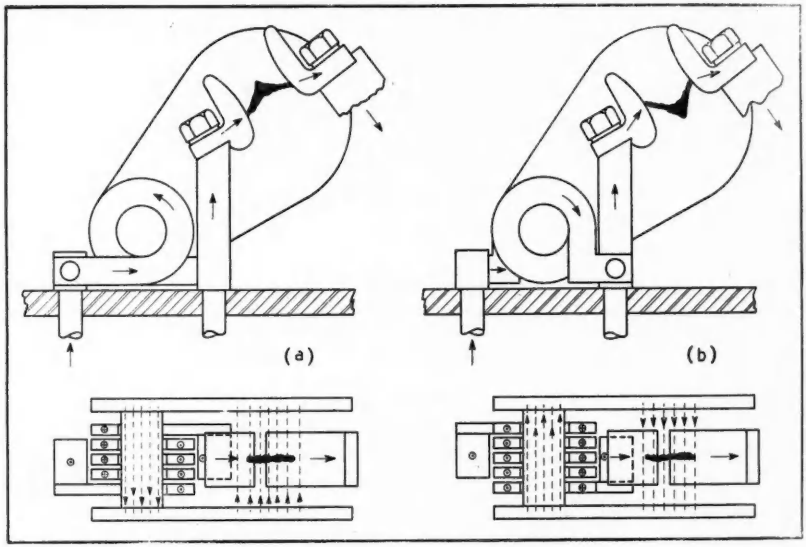


Fig. 4.—Magnetic blow-out coil: (a) correct and (b) incorrect operation

cannot be predetermined by economic production methods. The effect of reversal of direction of winding is shown in Fig. 4(b).

A further feature is the arc chute which encloses the contacts and restricts the arc to a space where it will not make contact with any neighbouring conducting material. Arc chutes are of non-combustible material of high electrical resistance, such as asbestos board, and are either hinged to allow contact inspection or are detachable. Similarly on enclosed apparatus the lid of the enclosure is usually lined with insulating material to prevent the arc going to earth.

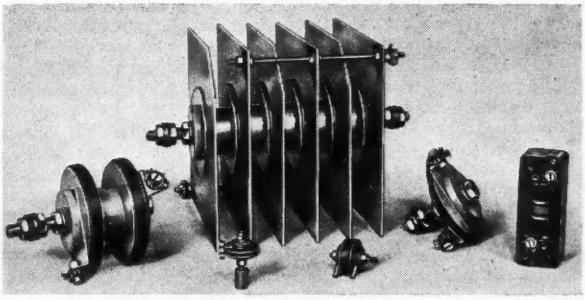


Fig. 5.—Silicon-carbide surge absorbers

Arc extinction that does not depend upon magnetic effects is exemplified in oil-immersed separating contacts. Oil has greater dielectric strength and specific gravity than air, and, very important, higher specific heat whereby it cools the arcing space more rapidly. This, together with the oil pressure exerted on the arc (the contacts usually being under the static pressure of the depth of oil in the tank), confines the arc more nearly to its main path and restricts the effects of lateral forces between charges, thereby reducing the area of ionization.

An early method (and one that is still employed by some manufacturers) of meeting risk of explosion was to separate the contacts in an inverted explosion pot.

From this development has taken many forms, such as the "turbulator," "cross-jet" and "De-ion grid." In the first two the gases liberated are circulated so as to force a stream of cool oil across the arcing gap. The third method returns to the magnetic form of arc control, but here the arc is torn laterally by magnetic means along its whole length into narrow chambers containing cool clean oil. More recently there has been a return to air-break circuit breakers wherein a jet of compressed air is directed against and blows out the arc as it forms.

All these methods aim at extinguishing the arc at the earliest and safest instant in order to reduce wear on main and arcing contacts.

Another line of approach is to reduce the current to zero before the contacts open by providing an alternative path for the arc that can absorb the whole of the stored energy of the circuit. In an early example of this method a condenser connected across the contacts was charged by the stored energy of the circuit when the contacts opened. This was effective when the energy stored in the condenser ($\frac{1}{2}CU^2$) was balanced by the quantity of energy stored in the inductive circuit ($\frac{1}{2}LI^2$).

Upon reclosing the circuit the condenser is short-circuited by the contacts, whereupon a high current of short duration flows and, if not damped by a series resistance, may be enough to weld the contacts. Optimum values of capacitance and resistance are selected to give a minimum of arcing on both opening and closing the switch contacts. Hence results are somewhat similar to those of the discharge-resistance method described earlier, but the latter method will serve larger power values owing to the limitations of size experienced in all condenser applications.

During recent years certain materials have been developed of outstanding performance under electrical influence. These do not follow Ohm's law (relating current flow, applied voltage and resistance of a circuit as a simple matter of direct and inverse proportion) unless the law be modified to include a higher power index than unity for the voltage.

Chief among these materials is silicon-carbide,* which varies in resistance according to the 3rd to the 5th power of the voltage, thereby giving an empirical equation of the form $E = KI^{\beta}$. where E is the applied voltage, I is the current flowing, and K is a constant; β may lie between 0.33 and 0.2. This property of silicon-carbide was first applied and is still used for the protection of overhead lines against high-voltage surges of lightning discharges. Discs sprayed with a metal coating are clamped face to face to form a surge arrestor, which is connected between line and earth. At normal voltages the unit operates as an insulator, but when the voltage across it is raised, it assumes the properties of a conductor and the surge is discharged to earth until the line voltage returns to normal value, when it once more acts as an insulator.

More recently smaller units of this material have been used for surge suppression at the contacts of electrical control apparatus, with highly satisfactory results. In these cases the problem is more complex, since the reduction in size of the unit entails a small creep current at normal voltage. This current raises the temperature of the disc and reveals a disadvantage of the material in that it has a negative temperature coefficient, resulting in over-heating, and this, if not allowed for in design calculations, may eventually so reduce the resistance that the unit is punctured. Where, however, the unit is designed to dissipate the heat generated on normal voltage it will continue to function indefinitely.

Typical examples of these units (Fig. 5) show the silicon-carbide in the form of an annular disc clamped between two circular-metal plates. Electrical connection to the faces of the disc is obtained by normal soldering direct to the material.

These units have very wide application, ranging from 100-h.p. motor-field control to contact protection on small switches. This field has been little explored and further investigation will, no doubt, reveal even more applicable forms of these materials. Acknowledgments are due to Dorman & Smith, Ltd., and the Metropolitan-Vickers Electrical Co., Ltd., in regard to the illustrations used for this article.

* "Silicon-Carbide Non-Ohmic Resistors," F. Ashworth, W. Needham, R. W. Sillars. *Journal I.E.E.*, Vol. 93, Pt. I, No. 69, p. 385, and No. 72, p. 595.

Ship Welding

COMPARATIVE TESTS

INVESTIGATIONAL testing of composite items of ship structures formerly conducted at Glengarnock by the Institute of Welding was taken over in June, 1945, by the British Shipbuilding Research Association. Three reports on this series of tests have been published (1940-44-45) and Part IV has been presented in the form of a paper to the North-East Coast Institution of Engineers and Shipbuilders, the test results being recorded as before in a form familiar to shipyard drawing offices.

The author is Mr. C. J. G. Jensen (British Corporation Register of Shipping and Aircraft) who is chairman of the B.S.R.A. sub committee concerned with these investigations. A foreword has been contributed by Mr. J. L. Adam, who has supervised the tests throughout.

Part IV records the comparison, by testing on a practical basis, of simple and compound girders formed by attaching sections of different shapes to plating. Contrasting riveted stiffeners with their welded counterparts, the removal of the faying flange does not (as indicated by previous tests) seem to reduce the inertia of the combined stiffeners and plating or the section modulus. The greater rigidity of welded bracketed stiffeners appreciably reduces their stress and deflection both of which decrease progressively as the bracket size increases. The end restraint introduced into an "unbracketed" stiffener by welding extension pieces to the supporting structure is much greater than when riveted. The importance of avoiding holes in the reverse flanges of frames and stiffeners has again been demonstrated.

Welded construction justifies some reduction in scantlings of riveted standards; those which appear to be reasonable are indicated in this paper.

New Die Foundry

THE re-equipment of one of the world's largest gravity die-cast foundries for the production of "Hiduminium" die castings has just been completed by High Duty Alloys, Ltd., at its Slough Works.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Fine-gauge Copper Wires

YOUR correspondent Mr. C. J. Bennett is apparently anxious to return to what he believes is the pre-war use of fine-gauge wires for flexibles, and we should like to tell him that we were responsible for the suggested changeover to 0.012 wires at the beginning of the war in so far as aircraft cables were concerned.

There was a great deal of opposition at the time, but this was readily withdrawn when it was pointed out that for many years 0.0076 had not been used as a standard on motor cars, and in point of fact there was a pre-war specification in existence giving the option to use 0.0076 or 0.012 wire. We proved conclusively that cables having 0.012 wires had been used over a period of eight years before the war, and at no time used a conductor of less than 14/0.012. With this change many of the troubles which arose from the use of 23/36s wire (for such things as side lights) were considerably reduced. Further, the American practice was to use cables having even thicker wires than 0.012, and this had been the standard practice for even a longer period. The adoption, therefore, of 0.012 wires became practically universal so far as motor car wiring was concerned.

During the war, the success of the changeover to 0.012 wire was so great that every department changed its specifications and continued with 0.012 until the end of the war. The argument that you get greater flexibility with finer wires is not of great importance when the number of conductors is large and the job suitable—such as the wiring of motor cars.

RIST'S WIRES & CABLES, LTD.,
A. Rist, *Managing Director.*
Newcastle-under-Lyme.

Peat for Generating Electricity

WITH reference to the report appearing under this heading in your issue of 26th November concerning the Scottish Reconstruction Committee of the Peat Development Association, the Royal Duchy of Cornwall experimented for many years on Dartmoor at a point approximately eight miles south of Okehampton. At one time approximately 90 men were employed on the project. Operations finally ceased in 1933. The experiment was for the production of oil from peat, and gas was produced in very large quantities.

No doubt the Duchy Office could help this Association in obtaining information regarding the experiment, which I believe was carried on over a period of twenty-five years.

G. GLADWELL,
Sales Manager,
Metropolitan Distribution, Ltd.
Truro.

Co-operative Competition

MAY I suggest to your readers a competition which is novel both in so far as that no individual prizes are offered and that time devoted to it will be well spent.

Competitors are asked to imagine a situation where a progressive social service body, working fifty years in advance of the times and therefore without hope that its work can be anything like fully understood by everybody, is facing a deficit of £10,000 during 1948. A large portion of that deficit results from the cost of providing emergency treatment for the current wave of tuberculosis cases in circumstances where public services are swamped.

This social service body is working for those non-manually engaged in a most important industry, and while many individuals in that industry have supported it with extreme generosity and have devoted much of their time to its service, the people in that industry in general have done little or nothing for it. The social service body has had itself, over the years, a fair number of fund-raising ideas, without which its plight to-day would have been very much more severe. Its health is a matter of real concern to every staff member in its industry, even if he or she does not realize it. Competitors are asked to make practical suggestions whereby further funds could be

obtained, such suggestions not to consist merely of a "brain-wave" idea but to comprehend also a practical means of carrying it out.

This competition is based on fact, the social service body being the Electrical Industries Benevolent Association, to the headquarters of which at 32, Old Burlington Street, London, W.1, competitors' attempts should be addressed.

One idea for money raising would be for everyone to give something immediately; well, we had already thought of that one, and we hope your readers will respond.

L. C. SHARP,
Chairman of the Court, Electrical Industries Benevolent Association.
London, W.1

Factory Transformers

REGARDING the article by "Rotor" in your issue of 19th November, vaseline, along with other "greases," has been proved to accelerate the formation of acidity in transformer oil. Therefore, the advice he gives to use this material on transformer gaskets is open to question.

GEOFFREY O. CASTELL, M.I.E.E.
Long Ditton, Surrey.

Lift Control

A MINOR modification, I believe, would enable the lift set-up described by Mr. F. P. Phillips in your issue of 12th November, to meet more closely one of the conditions set out under the heading "The Nature of the Problem." That is, "the switch must be capable of being closed so that at no time is the lift without overrun protection." This modification is as follows and reference will only be made to conditions at the top of the lift shaft.

Suppose the lift to be at the position shown in Fig. 3 (e), i.e., when the lift has overrun and the electrician has closed the switch by hand in order to bring the lift down. The fault has not been cleared and the lift is again travelling upwards. Just before the lift strikes the buffers, however, a second striker, which could be mounted lower on the body of the lift, again opens the switch. This time, however, the lift is almost on the buffers and no further protection is required. The second striker can naturally be set to stop the lift much nearer the buffers on account of the lower speed, as stated in the article.

Restoring normal conditions would, of course, entail two sets of manipulations to enable each striker to pass the switch. The modification suggested would not require any more headroom and the additional safeguard would be well worth the small extra cost.

Kingston-on-Thames. L. G. SMITH.

WHEN reading the article by Mr. F. P. Phillips in your issue of 12th November, it occurred to me that the partial imperfection referred to in Fig. 3(e) could be satisfactorily met by arranging that the striker, when raised to its "up" position, should at the same time disconnect the "up" control circuit. Under these conditions, the lift could be moved only in a downward direction until such time as the striker was restored to normal. NOVICE.

Cable Fatality

Gas Company Held Liable

IN the King's Bench Division on 25th November, Mr. Justice Morris gave judgment in favour of Mr. E. A. Buckland, of Catford, London, who claimed damages in respect of the death of his 13-year-old daughter against the Guildford Gas Light and Coke Co.

The plaintiff's case was that on 21st June last year his daughter climbed a tree through which the defendants' 11-kV cable passed and received a fatal electric shock. The tree had considerable foliage and there was nothing to indicate that there was any danger.

Defendants denied any liability to protect the tree from children and contended that the girl knew of the danger; the cables were all more than 20ft from the ground and were inspected twice yearly, when the foliage was cut back.

Giving judgment, His Lordship held that the girl had not trespassed nor was she aware that she was near a live cable. The defendants were aware of possible danger and were thus guilty of a breach of duty towards the girl and were liable for the accident.

His Lordship awarded £300 for expectation of life, £200 under the Fatal Accidents Act and £19 funeral expenses. A stay of execution was granted pending a possible appeal.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Eastern Electricity Board, Norfolk Sub-Area, has appointed **Mr. N. M. Wallace,** A.M.I.E.E., formerly district engineer, Dumfries and Galloway Sub-Area, South West Scotland Electricity Board, as manager of the Western District, and **Mr. R. Wolfe** as transport officer.

Mr. **T. H. Windibank,** M.I.E.E., has been appointed to the committee set up by the Ministry of Supply to investigate whether any technical, commercial or other advantages would be gained by reducing the variety of products manufactured. Mr. Windibank is a director of Crompton Parkinson, Ltd., and works director of the company's southern factories.

Mr. C. H. Nicholson, A.M.I.Mech.E., A.M.I.E.E., docks machinery engineer, North-Eastern and Eastern Regions, Railway Executive, has been appointed a member of the Working Party set up by the Minister of Transport to investigate the possibilities of increased mechanization in United Kingdom ports, with special attention to the handling of timber imports.

Mr. J. Ayres, A.M.I.E.E., has been appointed a local director of the Brush Electrical Engineering Co., Ltd., with the title of works director. Mr. Ayres joined the Brush Co. in January, 1946, and was appointed works manager-electrical in 1947, having received his early training with the General Electric Co., Ltd., and the Highfield Electric Co., Ltd. Other appointments which Mr. Ayres held before joining the Brush Co. were chief engineer and manager of the Electrical Division of Bryce, Ltd., a subsidiary of the Hackbridge Cable Co., Ltd., and chief electrical designer, and later general works manager, of Simms Motor Units, Ltd. He is a member of the Institution of Production Engineers and a Fellow of the Institute of Factory Managers.

Mr. J. Ayres

Mr. J. P. Longstaffe has been appointed district engineer of an area which includes Blackburn, Darwen and Accrington in No. 5 Sub-Area of the North-Western Electricity Board. He was formerly mains engineer with the Blackburn undertaking. **Mr. J. R. Hall,** formerly deputy borough electrical engineer at Accrington, has been appointed assistant district engineer for Blackburn, Darwen and Accrington. **Mr. A. L. Wallwork,** street lighting engineer in the Blackburn undertaking, has been appointed a senior assistant (power sales section) in the No. 5 sub-area consumers' engineer's department, North-Western Electricity Board.

Mr. C. P. Harrison has been appointed manager of the Marine Department of the General Electric Co., Ltd., as from 1st November, in succession to **Mr. C. Wallace Saunders,** who retired recently. Mr. Harrison was educated at Queen Mary's Grammar School, Walsall, and served a student apprenticeship at the G.E.C. Witton Engineering Works. After a period in the Fraser & Chalmers turbine works he returned to the Switchgear Estimating and Engineering Estimating Departments at Witton, where he later took charge of all estimates connected with marine equipment. In 1930 he went to the Marine Department at head office and since 1935 he has acted as chief assistant to Mr. Saunders. Mr. Harrison is a member of the Institute of Marine Engineers and has been author or joint author of several papers presented to the senior and junior sections of the Institute.

Mr. C. P. Harrison

Mr. F. R. B. Bucknall, A.M.I.E.E., power engineer at the P.O. headquarters in Scotland, has been appointed assistant telephone manager, Glasgow. Mr. Bucknall joined the P.O. engineering department as an inspector in 1926. After ten years' service in the Newcastle area he was transferred to the chief regional engineers' office in Edinburgh as chief inspector. He was promoted to assistant engineer in 1937 and has held his present post since 1942.

Mr. W. H. Taylor, M.I.E.E., who has retired from the position of general manager of the metropolitan system, Western Australian State Electricity Commission, had been associated with every phase of electrical development in the State. Appointed electrical superintendent in 1914, he was responsible for the erection of the East Perth power station. Later he was

appointed general manager of the Government Tramways, Ferries and Electricity Supply. In 1942 he submitted a report on the erection of a new power station at South Fremantle and visited London in connection with the project, which will cost £5 million. On his recommendation a trolley-bus service—the first in Australia—was started in Perth. He was consulting engineer to the Collie Power Co., which built the first power station in Australia using pulverized fuel.

Mr. H. Polliack, Junior, a director of H. Polliack & Co., Ltd., Johannesburg, left South Africa by air on 27th November for a visit of from eight to ten weeks to this country. He is interested in domestic electrical appliances, public address equipment, commercial refrigeration, and similar lines. Communications may be addressed to him at Barclays Bank (D.C. & O.), Circus Place, London Wall, London, E.C.2.

Mr. Arthur W. Cox, A.M.I.E.E., has retired from the position of Midlands and N.W. England representative of the *Electrical Review* which he has held for the past twenty-one years. At a recent farewell luncheon given by the directors he received a presentation from the staff of this journal. Two other members of the *Electrical Review* staff have been appointed assistant advertisement representatives—**Mr. K. W. Parrott** for Birmingham and the Midlands and **Mr. F. W. Hollings** for Manchester and the North of England.

Mr. A. W. Cox

Mr. F. Johnston, M.I.E.E., has retired from the position of chief electrical engineer to the Harland and Wolff organization after an association of over fifty years. To him is due much of the development of marine electrical engineering, and he did much pioneering and research work towards building it up. Mr. Johnston is a Finsbury graduate and joined the Institution of Electrical Engineers in 1897. He was awarded a Student's Premium and was a founder and past chairman of the Northern Ireland Centre. He has served on the I.E.E. Committee upon the regulations for the electrical equipment of ships almost since its inception and has served on a number of other committees, such as British Standards Institution, Lloyds, and the British Electrical and Allied Industries Research Association. When he joined Harland and Wolff in Belfast as an assistant manager of the newly formed Electrical Department, the construction of a generating station had just been started. This contained one set of 1,000 kW and four of 650 kW with a.c. and d.c. generators driven by Sulzer horizontal steam engines. To-day there are eleven substations in the works and the maximum demand is of the order of 15,000 kW with an annual consumption of 50 million kWh.

Lord Latham, chairman of the London Transport Executive, has been nominated by the President of France as Officer of the Legion of Honour. He was chairman of London and Thames Haven Oil Wharves, Ltd., from 1940 to 1947 and through that company, for the same period, a director of the Compagnie Industrielle Maritime, which handles nearly half of France's oil imports.

Sir Edward Appleton, secretary of the Department of Scientific and Industrial Research, has been awarded the Valdemar Poulsen gold medal by the Danish Academy of Technical Sciences for his outstanding work in radiotechnics and particularly for his research on the ionosphere. Sir Edward has been appointed Principal and Vice-Chancellor of Edinburgh University.

Major E. H. W. Banner, M.Sc., M.I.E.E., F.Inst.P., A.M.I.Mech.E., has commenced practising as a consulting engineer with especial reference to measurements and instruments. He had a wide experience of instrument design and development both with Ferranti, Ltd., and with the General Electric Co., Ltd.

Mr. T. Atherton, chairman of the Dorman Smith electrical group, is leaving this country shortly for a business tour of South Africa, principally in connection with the activities of the group's South African company, Dorman & Smith (Pty.) Ltd.

Miss Dorothy Taylor, holder of the third Travelling Exhibition in Electrical Housecraft awarded by the Caroline Haslett Trust, has returned from Canada. She will be giving a lecture on electrical developments in Canada at the Institution of Electrical Engineers on 14th January next. Tickets can be obtained from the Caroline Haslett Trust, 35, Grosvenor Place, London, S.W.1.

Mr. J. J. M. Browning, manager of the Service Department of Everett, Edgcumbe & Co., Ltd., retired on 26th November after forty-six years' service with the company. Mr. Browning, who has been associated with the instrument making industry for fifty-five years, joined Everett, Edgcumbe & Co. when their factory was in Charterhouse Square, and before becoming manager of the Service Department,

occupied various positions in the Works and Test Departments. He saw the foundation of the factory at Colindale and its subsequent extensions. Mr. R. E. Everett, the manager director, has presented him with a radio set on behalf of his colleagues.

Sir **Robert Robinson** was elected president of the Royal Society at the annual meeting of the Society held on 30th November. **Sir Alfred Egerton,** who has been physical secretary for ten years, is succeeded by **Prof. D. Brunt.**

Mr. F. C. W. Clark, A.M.I.E.E., has been appointed deputy sub-area engineer of the Lanarkshire Sub-Area, South West Scotland Electricity Board. Prior to vesting date he was deputy burgh electrical engineer at Hamilton and has been senior executive officer at Hamilton since then. His appointment dates from 1st October.

Lord Colgrain, chairman of the Telegraph Construction and Maintenance Co., Ltd., unveiled a memorial on November 19th to those employees of the company who lost their lives during the 1914-18 and 1939-45 wars. The ceremony took place at the Telcon Works, and the service of dedication was conducted by the Rev. Alan Watson, M.A., chaplain of the Royal Naval College. Sir Geoffrey Clarke, managing director, placed a wreath on the memorial, which was followed by several other floral tributes. Two buglers of the Royal Marines, Chatham, sounded the Last Post and Reveille. Those present included the directors of the company.

Obituary

Mr. W. A. Clatworthy.—The death occurred on 22nd November, at the age of eighty-two, of Mr. Walter Angove Clatworthy, M.I.E.E., A.M.I.Mech.E., a partner in the firm of Wheatley, Kirk, Price & Co., auctioneers, surveyors and valuers. Mr. Clatworthy was educated at Bristol Grammar School, High School, Hampstead, King's College, London, and the City & Guilds, London. He served a three years' apprenticeship in mechanical engineering with Fell & Co., and was for nine years draughtman and engineer with Immisch & Co. For the next nineteen years he was chief engineer with J. H. Holmes & Co., and was the inventor of the Holmes-Clatworthy inching printing press. He had been associated with Wheatley, Kirk, Price & Co. for many years, being chief valuer for twenty years before becoming proprietor of the company. He was a partner at the time of his death.

Capt. T. J. Holman.—The death is reported at the age of eighty-five of Captain Thomas John Holman, who was formerly chairman of the Topsham Electricity Supply Co.

Wills.—Mr. L. S. Carr, of Morpeth, Northumberland, retired electrical engineer, who died on 5th September last, left £27,271 gross (£27,185 net).

Mr. A. D. Shuter, M.A., of Harrow, Mdx, late of the Telegraph Construction and Maintenance Co., Ltd., who died on 1st September last, left £13,810 gross (£13,747 net).

Mr. G. Exley, managing director of Bancroft & Tordoff, Ltd., electrical contractors, Keighley, who died on 8th August last, left £3,033 gross (£2,071 net).

Mr. R. A. Trueman, formerly superintendent at Queensferry power station, who died on July 19th last, left £2,941 gross (£2,882 net).

Royal Society Awards

AMONG awards for 1948 announced by the Royal Society is the Hughes Medal to **Sir Robert Watson-Watt** for his researches into radio-telegraphy and the Rumford Medal to **Prof. Franz Eugen Simon** for his distinguished investigations of the properties of matter at low temperatures. The school of low temperature physics created by Prof. Simon at Oxford is one of leading centres of its kind in the world and has achieved important results in both theory and practice. His great knowledge of thermodynamics has led to the development of very simple ways of reaching extremely low temperatures in the laboratory and of improved methods that have facilitated observations which bear fundamentally on problems in superconductivity, especially the influence of impurities, and have explained the "freezing out" of magnetic flux. More recently extended equipment has assisted the study of the properties of atomic nuclei oriented in magnetic fields.

E.A.W. Essay Competition

THE prizes have now been awarded for the essay competition arranged by the Electrical Association for Women for schools affiliated to its branches. The subject of the essays was "Electrical Pioneers" and the winning essayists were: Sheelagh Fisher (aged 16), of the Ladies' College, Cheltenham, who will hold the Lady Mount Temple Cup and receive a cheque for two guineas; Sheila Forbes (aged 17) also of the Ladies' College, Cheltenham, who receives a cheque for one guinea; and Hilary Turberfield (aged 16), of the County High School for Girls, Stourbridge.

New E.D.A. Film

DURING the next two months a new four-minute film, "Men of Merit," produced for the British Electrical Development Association, is to appear on the screens of over 3,000 cinemas. The film is ingeniously contrived and "Technicolor" is effectively used. The central figure is a puppet Professor who delivers a lantern lecture, largely in irregular verse, upon man's constant pursuit of means for evading hard work—"spivism" as it is called nowadays. Reference is made to the "Super-Spivs," the scientists, who have contributed most to the achievement of this end.

During the lecture there is an electricity cut and, continuing by candlelight, the Professor takes the opportunity of demonstrating how the final straw breaks the camel's back and applying this analogy to the load on a power station. Breakdown is avoided only by load shedding and the audience is exhorted to keep off the peak. When the light is restored he shows how the future supply is being ensured by the erection of more and more power stations.

The value of electricity is stressed throughout the film; wise use is encouraged but abstention from use during peak hours is advocated. Great credit is due to the producers, W. M. Larkins & Co., Ltd. (in association with the Film Producers' Guild, Ltd.), for a successful attempt to deal with a painful subject in an attractive way.

Electricity Supply Failures

LESS inconvenience than might have been expected has been felt on the North-East Coast as a result of a breakdown of a 50,000-kW turbine at Dunston "B" power station. This set, which was running satisfactoriiy last Friday when shut down for the week-end, stripped its dummy blades when restarted on Monday. Owing to a good response by consumers to an appeal to minimize demands, a cut of only 5 per cent is reported. It is hoped to make up the deficiency in plant capacity by next Monday by coupling the alternator of this set to the sound turbine of a sister set (also installed in 1933). The alternator of the latter is now being rewound after having been burnt out when the end windings of its direct-connected step-up transformer flashed over, as reported in the *Electrical Review* of 15th October. The rewind is expected to be completed by the end of the year.

Failures of supply in the West Riding of Yorkshire on 23rd November, according to reports received, are attributable to a combination of frost and snow which caused the flash-over of insulators on transmission lines between Leeds and Harrogate and to a later accident at Kirkstall power station in which three men were injured. Conditions were said to be normal before the industrial load came on on the morning of 26th November. Attempts to restore supplies were made more difficult on account of switches being left on by consumers, causing immediate overloading and further tripping.

Standard Screw Threads

THE need for a standard screw thread series has been under discussion by the British Standards Institution and its counterparts in the United States for many years. The progress made towards co-ordination at the 1943-44-45 Conferences finally led to the signing on 18th November at a conference in Washington of an Anglo-American-Canadian declaration of accord with respect to the unification of thread form and a series of diameters and pitches for bolts, nuts and fastening threads of ¼in. and above in size. Smaller sizes are to be discussed further so will not for the present be included in the new "unified screw thread" system, as it is to be known.

The form of thread is one having a 60-deg angle; the bolt thread will have a rounded root with the alternatives of a rounded crest for use in the United Kingdom and flat crest for use in the United States, while the pitch-diameter series (fine and coarse) includes provision for special designs.

The United Kingdom delegation to the Washington Conference consisted of Sir Ewart Smith, Mr. P. Good and Mr. H. L. Griffiths representing the B.S.I., with Mr. T. R. B. Sanders of the Ministry of Supply. A provisional B.S. specification is to be issued early in 1949.

Another Atomic Pile

WHAT is described as the largest and "hottest" atomic pile in the United States is now nearing completion at the Brookhaven National Laboratory, Upton, New York. According to a *Reuter* message, Dr. Lyle B. Borst, director of nuclear reactory research at that laboratory, told the American Physical Society that the new reactor will have ten-thousand times the "bombarding strength" of the first graphite-uranium chain pile erected in 1942 at the University of Chicago. The new Brookhaven pile will be ready for operation early next year; it will be cooled by fan-impelled air currents and will be used for the quantity production of more than 200 radioactive isotopes, mainly for research purposes.

Fabricated Motors

WELDING CONSTRUCTION METHODS

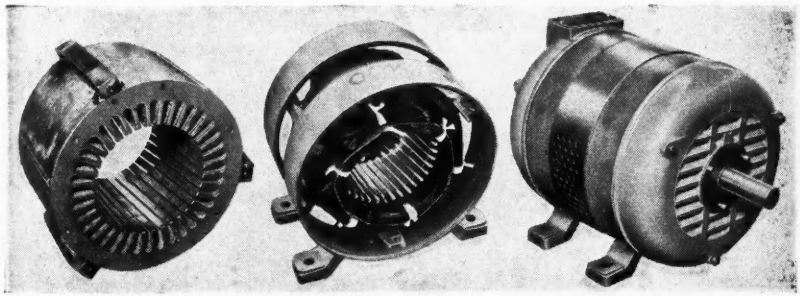
THE prolonged shortage of castings and sheet steel for the manufacture of electric motors caused Tilling Stevens, Ltd., of Maidstone, to develop a novel method of fabricating motor frames by welding which, apart from eliminating the need for castings, enables a larger number of machines to be made from a given weight of metal. For example, a fabricated 2-h.p. squirrel-case motor weighs only 54 lb as compared with over 100 lb for a machine of similar rating with cast-iron frame and end covers. Fabricated motors have a performance which compares favourably with that of more conventional machines.

The machines which are now in production at Maidstone include single-phase capacitor start types of from 0.25 to 1 h.p. The incorporated centrifugal switch is of robust design, being magnetically operated without the use of springs. Three-phase high starting torque squirrel-cage induction types of from 0.25 to 2 h.p. are also manufactured. Ultimately it is the company's intention to produce fabricated three-phase machines of up to 10 h.p. Satisfactory prototypes have already been made and plans for production are well under way.

The usual frame, bored to receive the stator laminations, is dispensed with. The lamination pack has welded to its periphery three mild-steel bars, on to which are subsequently welded two mild-steel rings, spigots being turned in them to locate the die-cast aluminium end covers. Apart from reducing weight, this method of construction permits efficient cooling. Fans fitted to each end of the rotor shaft draw in air through the end covers and direct it over the periphery of the laminations whence it is discharged through the perforated centre cover.

The first stage of manufacture consists of blanking the stator and rotor laminations from electrical sheet steel by means of two blanking and piercing presses and a battery of notching presses. The laminations then go to the inspection department where, after having been passed, they are wired together in packs, each containing the right number for a particular machine, the number being checked by weight against a standard pack.

The next operation is the welding of the three rectangular section spacer bars on to the outside diameter of the assembled laminations and for this purpose a specially constructed jig is employed. When the bars are in position a run of weld is made between them to give additional strength to the assembly. At this point it may be noted that instead of skewing the rotor slots, as is normal practice to reduce noise, the stator slots are skewed to achieve the same effect. This is done because it is more convenient to the method of construction and is easily arranged by suitably shaping the welding fixture. It also



Three stages in the assembly of fabricated motors showing (left) " welded up " lamination pack (centre) wound stator assembly, and (right) completed drip-proof machine ready for despatch

achieves a considerable saving in scrap.

The assembled laminations are then ready to receive the stator rings, which are held in position by means of another jig fixture and welded to the spacer bars. To reduce distortion of the rings during the welding operation a bevel is provided at each end of the spacer bars and a steel wedge is inserted between it and the rings. This operation is also arranged to cover welding the forged steel feet on to the rings.

Although it is so light by comparison with more conventional arrangements, this assembly incorporates all that is electrically and mechanically necessary for efficient operation. Another feature of importance is robustness. A completed stator assembly of this type can be dropped through distances of 2 or 3ft without the slightest damage being caused, not even broken feet. After cooling, the stator assembly is shot blasted to remove any rough edges and rust prior to the insertion of the coils.

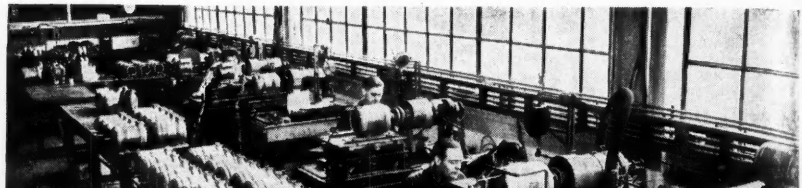
In the winding shop the stator coils are wound concentrically in groups of three from one length of wire, thus avoiding soldered joints. Insulating sheet is then placed in the slots and the coils inserted. After an insulation test the leads to the terminal box are fitted. Also, depending upon the type of motor, the star point is made, and in the case of capacitor start machines, the lead is prepared for the centrifugal switch. The final process is the vacuum impregnation of the coils. When this is done the stators are ready to receive the rotors and end covers.

Rotor laminations are prepared in batches, each containing the correct number in the same manner as those for the stator. By means of a press and jigs they are firmly fixed in position, two "V" grooves with raised edges forming a key to prevent rotary displacement. The larger machines have a small ring placed at each end of the laminations and welded into position to prevent longitudinal movement of the rotor.

Rotor bars are then dropped into place and brazed to a copper ring at each end, after which the outside diameter of the laminations is ground and treated with an anti-rust jelly. At this stage the final assembly takes place, the fans and end covers being placed in position and the bearings adjusted.

Before despatch from the works, each machine is finally checked in the electrical test department, where it undergoes a dynamometer test at no load and full load and is stalled six times.

The export managing agents for the motors are Henry W. Peabody & Co., Ltd., and London Electrical Co. (Blackfriars), Ltd., are the company's distributing agents for London and the Southern Counties.



Corner of the electrical test department at Maidstone showing the dynamometer test benches

Tobacco Growing

USE OF ELECTRICITY FOR SOIL HEATING

Mr. Coombes with some of his electrically raised tobacco plants. These particular plants are being kept for seed

THE increasing interest in tobacco growing in this country renders experiments by Mr. R. H. Coombes, of Ross-on-Wye, of particular importance. At his nurseries in Eastfield Road, Mr. Coombes has 1,000 yd of continuous glass cloches, the soil beneath which is electrically heated by means of bare galvanized iron wires run six inches below the surface. The heating wires, which are arranged zigzag in double rows six inches apart, are fed from a 25-V supply obtained from a transformer connected to the 230-V mains. The most satisfactory loading for tobacco growing has been found to be 5 W per sq ft.

Early in March the tobacco seeds, which are very tiny (about 350,000 to the ounce), are scattered on the prepared soil, the cloches are placed in position and the electricity is switched on. The normal mid-March soil temperature under cloches is about 40 deg F. Within about 36 hours the temperature of the soil is raised to 58 deg F, and within fourteen days the seeds germinate, compared with the usual three weeks. If the weather is mild, the electricity can be switched off, the soil retaining its heat for a considerable time. The plants are ready for transplanting at the end of May. The seven thousand plants required for an acre of land can be raised in a 10 yd run of cloches for sale at 6s a dozen, electricity for the whole period costing about 15s. No labour costs are involved.

Soil-heating cable is placed 6in. below the surface in double rows 6in. apart

Visualizing the possibility of establishing a tobacco-growing industry in the Ross district, Mr. Coombes has also been investigating the question of curing the tobacco locally. The solution, he thinks, may be the setting up of co-operative curing barns costing about £1,000 each to handle the crop of several farmers. He has himself built a small experimental installation which utilizes electricity for providing hot air for drying and steam for humidifying.

Mr. Coombes has also used the soil-warming apparatus for other crops as well, and in February has had potatoes 9 in. high, green peas showing bloom and radishes fit to pull. Tulips planted in November have been cut earlier than those planted in September without heat.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Air Commodore Harvey asked the Minister of Fuel and Power, whether, in view of the fact that a circular, dated 4th October, giving notification of increased charges for electricity with effect from 14th October, was not received by certain householders served by the London Electricity Board until 12th November, he would modify his policy of increased charges.

Mr. Gaitskell replied that the circular in question clearly stated that the variation in the rates applied to electricity consumed after the first meter reading following 14th October. He was also informed that in case consumers should not have seen the public notices inserted in local newspapers, this circular was being delivered in most districts by the meter readers when taking the readings for the period before the higher charge applied. In other districts the circular was being sent by post beforehand.

Oil-Burning Equipment

Mr. Erroll asked the Minister of Fuel and Power what progress was being made in relaxing the restrictions on the installation of fuel-oil burning equipment; and when would outstanding requests for permission have been cleared up.

Mr. Gaitskell referred to a reply to a question on 6th May, when he explained that in a limited number of cases whose economic merits were exceptional, conversion to oil could be completed. Under this arrangement schemes of conversion had in fact been approved authorizing consumption of oil at an annual rate of 340,000 tons. As regarded the latter part of the question, he had nothing to add to the statement he made in May.

Asked whether he could say when he expected it would be possible to install oil-burning equipment without the necessity of obtaining permission, Mr. Gaitskell replied that they had the matter under continuous review. He could not tie himself down to a particular date at the moment.

Hearing Aids

Sir Waldron Smithers asked the Minister of Health when the electrical hearing aids referred to in his pamphlet published prior to 5th July last would be ready; and whether they would be of the same quality as the ones now obtainable for £24.

Mr. Bevan said that over 3,000 Medresco hearing aids had already been supplied to patients. He was advised that this aid gave a performance at least as good as that of any commercial aid available.

Electricity in Uganda

Mr. Skeffington asked the Secretary of State for the Colonies whether any progress had yet been made in connection with the Owen River Hydro-Electric Development Scheme in Uganda.

Mr. Creech Jones said that the scheme had received considerable attention, but without consultation with the Uganda Government they were not able to state the position reached.

Exports to Russia

In a statement circulated in reply to a question by Mr. Byers, the Secretary for Overseas Trade (Mr. Bottomley) stated that included in exports to the Soviet Union in the twelve months ended September last was 3,792 tons of electrical machinery valued at £1,746,000 and electrical goods and apparatus to the value of £472,000.

B.E.A. Contracts

DURING the past month the British Electricity Authority has placed contracts for generating station, switching and transforming station and transmission equipment amounting in the aggregate to £4,026,526. The principal contracts include:— Circulating water pipes, Deptford East generating station (Sir Wm. Arrol & Co., Ltd.); 3.3 kV and 415 V switchgear, Croydon "B" station (A. Reyrolle & Co., Ltd.); 3,000 and 415 V switchgear and accessories, Poole station (British Thomson-Houston Co., Ltd.); steelwork, Stourport "B" station (Dorman, Long & Co., Ltd.); hyperbolic reinforced concrete cooling tower, Huncoat (Accrington) station (Bierrum & Partners, Ltd.); 66 kV 2,500 MVA switchgear, Islington sub-station (British Thomson-Houston Co., Ltd.); 132 kV and lower voltage cables, Beddington (Croydon) (Pirelli-General Cable Works, Ltd.); 275 kV line, Staythorpe-Bolsover (British Insulated Callender's Cables, Ltd.); 45 MVA 132/33 kV transformers, Troste sub-station (C. A. Parsons & Co., Ltd.); 132 kV lines, Skelton Grange (Watsham's, Ltd.); 33 kV lines, Hartshead-New Mills and Hartshead-Ashton-under-Lyne (J. L. Eve Construction Co., Ltd.); 33 kV, 6.6 kV and multicore cables, Wigan (British Insulated Callender's Cables, Ltd.); and 132 kV 2,500 MVA switchgear, Braehead (Glasgow) (A. Reyrolle & Co., Ltd.).

Canadian Electrical Industry

Record Production : Lower Exports

By E. VICTOR MANSER
(Managing Editor, *Electrical Digest*, Toronto)

THE manufacture of electrical equipment in Canada reached the figure of $366 million in 1947. This was an "all-time" record for the industry, being higher than the 1946 total of $234 million by 56 per cent and exceeding the busiest war year, 1944, when production was valued at $283 million. While higher prices have served to some extent to increase the dollar value of production, other factors, such as the record level of employment in the industry of 52,736, indicates the increased physical volume of production. A sharp increase in the total number of plants in the industry took place with 296 now operating compared with 266 in 1946.

The total paid in salaries and wages by the industry passed the $100 million mark for the first time, reaching $103,891,000, an increase of 32 per cent over the 1946 total of $74 million.

In only one direction was there a decline from the previous year. This was in the export of electrical goods which dropped from $20,939,342 in 1946 to $19,135,446 in 1947. This figure will probably be even less favourable in 1948 with a steady retraction taking place in export markets.

The record figures for 1947 are a far cry from the days of the "hungry thirties." In 1936 the production of the electrical manufacturing industry was $72 million and 17,037 were employed receiving $19½ million in wages and salaries. An analysis of the Canadian electrical manufacturing industry for the past twelve years is given in the accompanying table.

The contraction of the export market for Canadian electrical goods was the subject of a recent submission of the Canadian Electrical Manufacturers' Association to the Hon. C. D. Howe, Minister of Trade and Commerce in the Dominion Government. This brief stated that Canadian producers were now almost completely shut out from Empire markets that had been developed with a great deal of labour and expense over the past two decades, despite the fact that Canadian purchases were at an "all-time high" in these areas. The Association declared that the loss of these markets would have several long-term disadvantages to Canada since many electrical manufacturers (mainly from the United States) established factories in Canada to take advantage of our preferred position in Empire trading. If Empire markets remain closed these operations might be transferred to the sterling area with a resultant loss of employment and trade to Canada. This Empire trade has been

CANADIAN ELECTRICAL APPARATUS AND SUPPLIES INDUSTRY—1936-1947

Year	Number of plants	Average number of employees	Salaries and wages $	Cost of fuel and electricity at works $	Cost of materials at works $	Gross selling value of products at works $
1936	186	17,037	19,501,882	1,187,942	30,484,468	72,288,548
1937	191	21,706	26,291,436	1,331,249	41,695,446	98,841,992
1938	188	20,353	24,978,077	1,199,103	35,916,344	90,129,119
1939	190	20,261	25,711,092	1,266,471	39,331,766	89,060,578
1940	194	25,120	33,246,655	1,621,175	58,371,201	130,001,367
1941	211	33,086	47,210,886	2,003,990	77,466,516	177,903,626
1942	225	39,676	61,799,069	2,249,743	92,799,017	208,872,781
1943	223	46,928	76,906,994	2,440,467	109,281,060	245,770,859
1944	234	48,834	82,304,460	2,488,432	120,413,034	283,071,440
1945	247	44,129	76,468,795	2,570,945	92,041,030	230,531,874
1946	266	43,998	74,510,479	2,667,477	101,939,272	234,572,653
1947*	296	52,736	103,891,016	3,515,897	162,131,266	366,506,203
Per cent change, 1947, from 1946 ...	+ 11.3	+ 19.8	+ 39.4	+ 31.9	+ 59.0	+ 56.2

Note.—Profits or losses cannot be calculated from the above figures as data are not available for general expense items, such as interest, rent, depreciation, taxes, insurance, advertising, etc. * Preliminary and subject to slight revision.

an important part of the operations of many Canadian electrical manufacturers with many companies expanding their facilities in the past to handle the business. Added to this, most firms increased their capacity during the war and look to the export market for an outlet.

The Association has advanced several proposals to the Federal Government. It stated that since Canada bought a great deal within the Empire, negotiations should be opened with the British Government so that Canadian manufacturers could continue to supply at least a share of these markets and that this could be done without jeopardizing the British financial position. There is a feeling in Canada that the British financial difficulties are being used as an excuse to block Canadians from former markets, particularly in the West Indies. The Association stated that when loans have been made by Canada to Great Britain they have generally been used to purchase agricultural products and raw materials. It was suggested that at least a portion could be used for manufactured goods.

Electrical Appliances

The Canadian market for all types of electrical home appliances, with the possible exception of radio sets, remains good. Despite the fact that Canadian homes are already well equipped with many electrical labour-saving devices, recent surveys have revealed that the market is still far from saturated. The *Canadian Home Journal*, a consumer magazine, recently conducted a survey of 1,000 typical Canadian homes and the results, although admittedly fragmentary, give in a general way the potential market for electrical appliances. It was found that 91 per cent of the homes had electricity but of these only 31.2 per cent cooked electrically; wood and coal burning equipment was used in 53.9 per cent of the homes. About 19 per cent of the householders stated that they intended to purchase an electric range and planned to pay between $200 and $300 for it. Features that would be wanted on this range were listed in the following order of popularity; automatic oven control 25.5 per cent; glass or transparent oven door 12.8 per cent; larger oven 9.3 per cent; deep well cooker 6.1 per cent; automatic timer 6.1 per cent.

It was found that 76 per cent of the homes surveyed had electric washing machines but that about half of these were ten years or more old; 43 per cent of the homes had electrical refrigerators and of these 37 per cent were ten or more years old. About 20 per cent of the home owners planned to purchase new electric washing machines and 33 per cent were prepared to pay between $200 and $300 for a new refrigerator.

Many of the smaller appliances have reached a high level of use in Canadian homes. It was found that 88 per cent of the homes had electric irons, 82 per cent had electric toasters, while 67 per cent owned an electric vacuum cleaner. However, many of these appliances were over ten years old and an important replacement market apparently exists. Other small appliances were in use in Canadian homes to the following extent: electric food mixers 18 per cent; hot plates 38 per cent; electric blankets 2 per cent; electric heating pads 32 per cent; electric portable heaters 21 per cent; and electric fireplaces 5 per cent.

Radio sets have not only overtaken demand in Canada but are a glut on the market with surpluses and price cutting the order of the day. Recent sales of radio receivers have been from 25 to 50 per cent below former prices and some "cutbacks" and "lay-offs" are now taking place in the radio manufacturing industry. During 1947 sales of radio receiving sets by Canadian producers totalled 836,000, compared with 251,000 in 1938, and 370,000 in 1949. Production of radio receivers this year has dropped sharply with June, 1948, production totalling 26,556 units. In June last year 60,683 units were made.

There are no television broadcasting stations in operation in Canada at the present time, although the Canadian Broadcasting Corporation has indicated that it will probably have stations in operation in the larger centres such as Toronto, Montreal and Vancouver within the next year or two. There is a limited market in Canada for television receivers since several of the United States stations, including Buffalo and Detroit, have some Canadian coverage. Canadian radio manufacturers are now producing television receivers in small quantities.

COMMERCE and INDUSTRY

E.R.P. Plant for Great Britain : Contractors' Steel Supplies

IT was announced on Sunday last that during the last quarter of this year and the first quarter of next year machinery and equipment to the value of over $95 million will be received by 2,500 British manufacturers under the European Recovery Programme. The Government statement said that the deliveries would include constructional and mining equipment, turbines, generators and motors, machine tools, etc.

B.E.A. and Building Workers

Conditions of employment of building and civil engineering workers in the electricity supply industry will, in future, be settled by a National Joint Committee as the result of an agreement between the British Electricity Authority and the National Federation of Building Trades Operatives. This National Joint (Building and Engineering) Committee will consist of representatives of the Authority, the Electricity Boards and the North of Scotland Hydro-Electric Board, together with representatives of the National Federation. It will settle by negotiation terms and conditions of employment throughout the country, and provision is made for arbitration in the event of failure to reach a settlement. Arrangements will be made for consultation at district level on local matters.

Large Transformer for West Ham

The accompanying illustration shows a 30-MVA, 66/11-kVA transformer crossing London Bridge by night en route to the West Ham power station. It is one of two identical units manufactured by Johnson & Phillips, Ltd. The design is of the impulse-tested class based on tests carried out at the N.P.L. on full-scale h.v. and l.v. windings. All other proving tests were conducted at the maker's works, including a temperature run via a 7.5-MVA alternator, the installation of which formed part of the recent factory reconstruction. The complete transformer weighs about 95 tons with cooling gear and occupies an area of 26ft by 23ft.

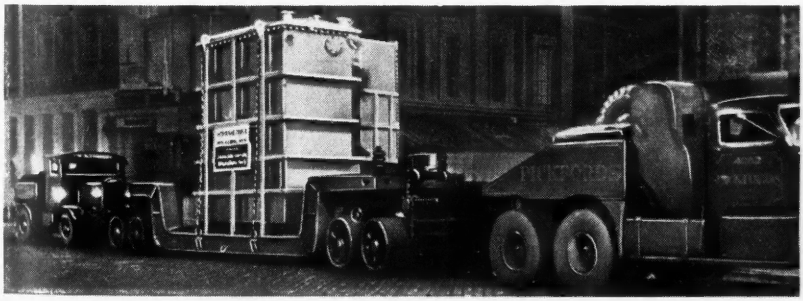
Despite the comparatively short distance from Charlton to West Ham—the cooling towers of the new station being visible from the J. & P. Works—traffic restrictions and the Thames crossing necessitated a lengthy detour via Shooter's Hill, Eltham, Lee, Lewisham, Brockley, New Cross, Peckham, Camberwell, London Bridge, Mansell Street and Commercial Road.

Arbitration Tribunal Rules

Details of the procedure to be followed in connection with cases brought before the Arbitration Tribunal set up under the Electricity Act, 1947, are set out in S.I. 1948 No. 2476, the Electricity Arbitration Tribunal Rules, 1948 (H.M. Stationery Office, 2d). Communications should be addressed to the Clerk, Electricity Arbitration Tribunal, Royal Courts of Justice (Room 776), Strand, W.C.2.

Steel for Electrical Contractors

Mr. L. C. Penwill, director of the Electrical Contractors' Association, has informed his members that although the "W.B.A." priority distribution scheme has now ceased to operate, supplies of iron and steel for building work (including electrical installation work) are still so short that it has been



J. & P. 30-MVA transformer on the way to West Ham

found impossible to relax the allocation schemes now in force. Consequently, members should continue to follow the E.C.A./I.S. Scheme in connection with their requirements of iron and steel for use in electrical contracting operations.

Supervisors' Institute

The formation is announced of the Institute of Industrial Supervisors with headquarters at Bank Chambers, 47, Temple Row, Birmingham, 2. Candidates for membership are required to be not less than thirty years of age, to give proof of technical and executive knowledge, and to have held a substantive supervisory position for at least five years. There are also associate and graduate classes with lesser qualifications, associates, affiliates and honorary members.

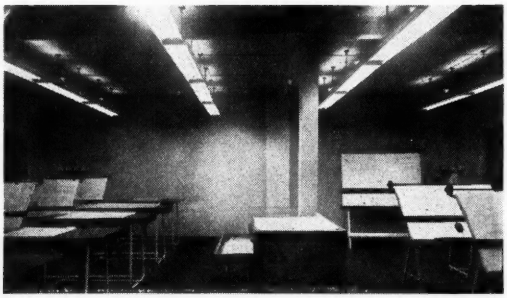
The Institute's main objects are to provide educational facilities for members; to establish the professional status of foremanship and other high grades of industrial supervision; and to improve the efficiency of industrial supervision. The president is Sir Percy H. Mills and the chairman of Council Mr. F. E. Credicott. Among the members of the Provisional Council are Messrs. J. Aldhous and A. R. Jarvis (Simplex Electric Co.). The general secretary is Mr. A. J. Mansell.

E.C.A. Annual Dinner

We recently reported that the Electrical Contractors' Association had decided to revive its annual dinner. It is now announced that the dinner will take place on 25th January at Grosvenor House, Park Lane, London, W.1; tickets will be 30s each (excluding wine).

Drawing Office Lighting

Cheerful and light surroundings are essential for the drawing office, and Peter



Brasshouse, Ltd., Birmingham, have installed "Ekco-Ensign" fluorescent lamps and fittings in their drawing office. The fittings chosen for this installation are open-top dispersive type FF13 permitting maximum downward light combined with a degree of light on the ceiling and walls to provide shadowless working conditions. Used as continuous troughing in rows 7ft apart and 8ft 6in above floor level, the illumination value is 20 lumens per sq ft at working level. The electrical contractors were the Stuart Electrical Co.

Torquay Convention

A warning regarding accommodation at Torquay during the National Electric Power Convention is given in the November *B.E.A. Journal*. Delegates are reminded that it is necessary for them to make their own arrangements although the secretary of the Convention is willing to assist in cases of real difficulty.

R.C.M.F. Exhibition

The sixth annual private exhibition of British components, valves and test gear for the radio, television, electronic and telecommunication industries will be held in the Great Hall, Grosvenor House, Park Lane, London, W.1, from March 1st to 3rd next. Approximately a hundred exhibitors will be participating. Special facilities will exist for the reception and information of manufacturers and agents from abroad. Admission will be by invitation only and applications for tickets and further informaton can be obtained from the Secretary, Radio Component Manufacturers' Federation, 22, Surrey Street, Strand, London, W.C.2.

Battery Production in South Wales

Mr. Harold B. Temby, an American efficiency expert, has arrived at Treorchy, South Wales, to help organize on sound and up-to-date economic lines a newly established factory of Electric and Musical Industries, Ltd., which has just started to manufacture batteries. Mr. Temby's visit is independent of the work of the Anglo-American Council on Productivity, whose first report was issued recently.

The company decided to set up a factory in the Rhondda Valley in 1944, after a flying bomb had damaged its premises outside London. It covers 184,000 sq ft; 740 men and women are employed, two-fifths being men of whom 23 per cent are disabled ex-miners. When the plant is in full production there will be work for 1,200 persons. When the war ended the company was turning

out household appliances, radio equipment and other goods. Many factors, including purchase tax, difficulties over export quotas and licences, severely curtailed production earlier this year and the number of workers had to be reduced from a peak of 830 to 450. The company looked round for an alternative product and decided to make batteries, and the necessary plant was installed and machinery obtained from America.

As part of the plan to increase production it is hoped later on to arrange interchange of Welsh and United States workers.

British Power Plant in Turkey

On Sunday last the first set in the Chatalagzi power station, Turkey, which is to serve the Zonguldak coal basin and north-west Anatolia, was inaugurated in the presence of the British Ambassador, Sir David Kelly. The generating plant consists of three Metropolitan-Vickers 20,000-kW steam turbo-generators; the Babcock & Wilcox boilers are designed for using low-grade and waste coal. The civil engineering work is by Holloway Bros. and British Insulated Callender's Cables, Ltd., are erecting the transmission lines.

It is expected that the second set will go into service next May, and the third in 1950.

Lead Companies Amalgamate

From 1st January next the Cookson Lead & Antimony Co., Ltd.; Locke, Lancaster & W. W. & R. Jobson & Sons, Ltd.; Walkers, Parker & Co., Ltd.; Foster, Blackett & James, Ltd. (lead departments only); Librex Lead Co., Ltd.; London Lead Oxide Co., Ltd.; A. T. Becks & Co., Ltd.; and the Oidas Metals Co., Ltd., will no longer use their individual names but will trade under the single name of Associated Lead Manufacturers, Ltd.

Under the new organization there will be three main area offices at London, Newcastle and Chester, the head office also being in London.

Big L.C.C. Housing Scheme

On Thursday last week the chairman of the London County Council, Mr. Walter R. Owen, officially opened the first house on the Council's new Harold Hill estate, near Romford, Essex. Covering 1,460 acres, this estate, which is the largest post-war scheme in the London area, will include 7,600 dwellings, eleven schools, community and health centres, shops, cinemas, churches, and 523 acres of parks and open spaces, together with 81 acres reserved for industry. A dozen different types of house are to be built, among them a small number of "middle-class" designs.

The house opened last week is of the semi-detached, five-roomed type. Provision is made for an electric cooker, water heater and wash-boiler and there is an adequate installation of plug points for other appliances in all rooms. A 2-kW inset fire is fitted in the largest bedroom. To deal with drainage problems on the estate an automatic pumping station is being erected with three 48,000-gal per hour electrically operated pumps. The main building contractors are W. & C. French, Ltd., the electrical work being carried out by Evans & Shea, Ltd.

Batti-Wallahs

The title of Mr. J. F. Shipley's address at last week's luncheon of the Batti-Wallahs' Society was "Safety at Sea," but the trend of his remarks did not relate to modern marine electrical equipment, as might have been expected. He chose to talk about the navigational difficulties of early times, commencing with the Danish and Roman invasions of this country, and going backwards to the ancient Greeks, in the course of which he showed a profound knowledge of ancient sea lore.

There will be no luncheon of the Society this month, the next luncheon being on 27th January.

Canadian Trade Fair

The Canadian Government Exhibition Commission has announced that the International Trade Fair organized at Toronto earlier this year achieved a degree of success which justifies its establishment as a regular event. It will accordingly be held again in the same buildings from 30th May to 10th June, 1949. Conditions of participation will be broadly the same as this year. Full details and application forms are obtainable from the Canadian Government Exhibition Commission's representative in London, Miss M. A. Armstrong, Canada House, Trafalgar Square, S.W.1. (telephone: Whitehall 8701). Exporters are reminded that applications for space in the 1949 Fair must be in by 31st December next.

Diary

Rich & Pattison (B'ham), Ltd., have sent us a pocket diary which contains an unusual amount of electrical data (pp. 146). It is neatly bound in brown leatherette.

Admiralty Draughtsmen

The Admiralty is inviting applications from draughtsmen in the mechanical, electrical, electronic and constructional engineering categories for service in certain research and development establishments situated in various parts of England and Scotland (principally Southern England).

Appointments will be on temporary basis but with an opportunity, which it is expected will arise within twelve months, to compete for established appointment. Applications should be sent to C.E.II (Room 88), Empire Hotel, Admiralty, Bath. Original testimonials should not be forwarded.

Radiolympia 1949

The Radio Industry Council announces that the 16th National Radio Exhibition ("Radiolympia") will be held at Olympia, London, from 28th September to 8th October, 1949. There will be a pre-view with admission by invitation only on 27th September. Intending visitors from overseas are asked to inform the Radio Industry Council, 59, Russell Square, London, W.C.1.

Safety in Mines

How the development of the use of electricity results in a corresponding reduction in the number of accidents was shown at an exhibition dealing with health, safety and training in mines held at the Ministry of Fuel and Power building, 7, Millbank, London, S.W.1. Arranged by the Instruction Section of the Safety in Mines Research and Testing Branch of the Ministry, Sheffield, in conjunction with the Inspectorate and other members of the division, the exhibition drew special attention to flameproof enclosures for large electrical apparatus, together with the latest systems of testing. The development of safe cables which are free from explosion and other hazards were also dealt with, as well as intrinsically safe low-voltage electrical equipment for signalling, telephony and remote control circuits. A special section traced the evolution of mine lighting from the use of open lights to the latest electric safety lamps and fluorescent fittings.

Trade Announcements

Cyc-Arc, Ltd., 27/29, New North Road, London, N.1, has opened a new factory in S. Wales devoted to the manufacture of studs and attachments for their stud welding equipment.

J. H. Tucker & Co., Ltd., announce that Mr. G. A. Ruff, at present London area manager, will be transferred to Birmingham headquarters on his appointment as home sales manager from 1st January, in succession to Mr. S. A. Millington. Mr. A. H. B. Elley has been appointed London manager, whilst Mr. S. G. Smith and Mr. A. R. Page, A.M.I.Mech.E., A.M.I.E.E., will continue as area managers for Scotland and Northern England respectively.

Cox & Danks, Ltd., have opened a new depot at Scapa Works, Neath, Glam (telephone: Neath 2505; telegrams. Ferrodanks, Neath), to which address all communications should be sent.

From Monday next the address of the **Supra Electrical Co., Ltd.,** will be 26, Soho Square, London, W.1 (telephone: Gerrard 4012).

The Edinburgh Contracts Department of **British Insulated Callender's Cables, Ltd.,** is at 15B, St. James's Square, Edinburgh, 1, and not 158, St. James's Square, as stated in our last issue.

Trade Publications

Anglo-Swiss Screw Co., Ltd., West Drayton, Middlesex.—Illustrated brochure and leaflet on small turned metal parts for light industrial uses.

J. M. Webber & Co., Ltd., 244, Tottenham Court Road, London, W.1.—Priced catalogue of cables, miscellaneous accessories, domestic appliances, etc.

Automatic Telephone & Electric Co., Ltd., Strowger Works, Liverpool, 7.—Folder illustrating the sound distribution and amplification system at the B.O.A.C. flying boat terminal, Southampton Docks. Folder describing 5, 10 and 15 line intercommunication telephone equipment.

Grampian Reproducers, Ltd., Hanworth Trading Estate, Feltham, Middlesex.—Priced catalogue of public address equipment.

Downes & Davis, Ltd., 1-9, Stanley Street, Liverpool, 1.—Trade price list of electrical accessories.

A. Gallenkamp & Co., Ltd., 17-29, Sun Street, London, E.C.2.—Priced leaflet describing a thermostatically controlled bath for laboratory use.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2. — Technical brochure dealing with cold pressure welding particularly as applied to aluminium.

Crompton Parkinson, Ltd., Astor House, Aldwych, London, W.C.2.—Three priced leaflets illustrating six fluorescent lighting fittings for use with two or four 40-W tubes.

B. & H. (Nottingham), Ltd., Papham Street Works, Nottingham.—Six priced leaflets on miscellaneous wiring accessories and domestic switch and fuse gear.

Linealux, Ltd., 142, Liverpool Road, London, N.1.—Priced folder on decorative lighting fittings for 284 mm double-ended tubular lamps.

Morphy-Richards, Ltd., 121, Victoria Street, London, S.W.1.—Priced leaflet illustrating an automatic toaster.

Moat (Electrical Wholesalers), Ltd., 83, Blackfriars Road, Salford, Manchester.—Priced catalogue of electrical accessories.

All-Electric Flats

COMMUNAL LAUNDRY AT HAMMERSMITH

WITH not a single gas or solid-fuel appliance in the building, a block of fifty-six flats just opened on the Hammersmith Borough Council's Aspen Gardens Estate can truly claim to be all-electric. In addition to the comprehensive installation of plug points provided there is a considerable amount of apparatus included as standard equipment without extra charge on the rent which has been fixed at 19s 3d a week for the one-bedroom type, 25s 3d for the two-bedroom and 30s 9d for the three-bedroom type, inclusive of rates.

An imitation coal fire is a standard fitting in the living room

Three plug points are available in the living room where a 2-kW "Creda" imitation coal fire is fitted. The best bedroom is equipped with a 2-kW inset panel fire with tiled surround, another outlet being provided for other appliances. In the second bedroom there are two plug points and one in the third bedroom. A 2-ft Unity tubular heater warms the linen cupboard.

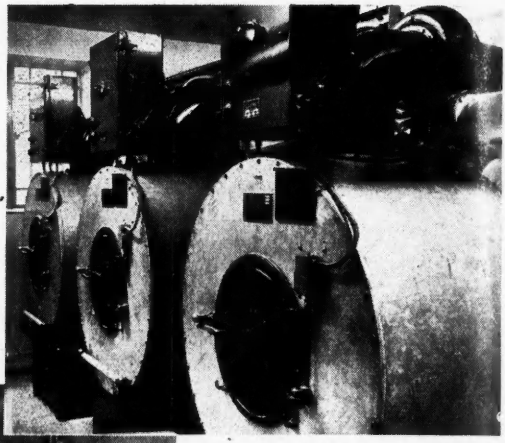
The kitchen equipment includes a G.E.C. or Jackson cooker (with thermostatic oven control and "Simmerstat"), an electric kettle, a 20-gal "Sadia" under-draining-board water heater and a 1-kW "Creda" reflector fire mounted on the wall. Lights are provided over the sink as well as in the centre of the room. The flush-mounted cooker control unit with plug socket for the kettle incorporates a trans-former-operated pilot light, a 6.5-V lamp operating from a 3-5-V supply; this will practically eliminate pilot light maintenance. A separate plug point is available over the worktable for the iron, etc. Holophane bulkhead lights illuminate the balconies. Keighley automatic lifts serve all floors.

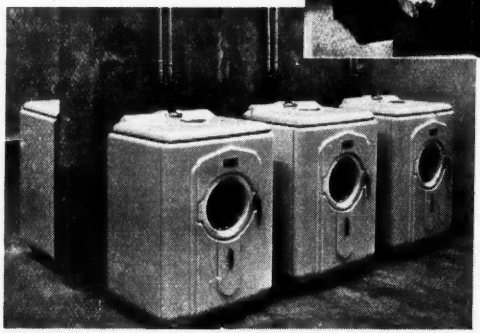
Kitchen equipment includes an electric cooker, kettle, a 20-gal under-draining-board water heater and (not shown) a reflector fire mounted on the wall.

The clothes-washing problem has been solved by the provision of a communal laundry equipped with twenty "Bendix" automatic washing machines and

three Isaac Braithwaite & Son's rotary drying machines. In forty minutes the Bendix machines wash, rinse and spin-dry the clothes, a further twenty minutes completing the drying in the Braithwaite apparatus.

Hot (softened) water is supplied from two 600-gal cylinders each with banks of Heatrae immersion heaters at the bottom (45 kW) and near the top (60 kW). The immersion heaters operate only at off-peak periods; the temperature of the water is





(Above) Rotary clothes drying machines. (Left) Twenty "Bendix" washing machines are available in the communal laundry

controlled by means of "Satchwell" thermostats operating contactors, manually-reset "safetystats" with red lights on the control panel being provided to guard against any possibility of the failure of the normal control gear. A safety valve and an open expansion pipe are also provided.

The drying machines, each incorporating a 1.1-h.p. Crompton Parkinson motor driving an extract fan and an 0.2-h.p. motor rotating the perforated cylindrical clothes container, are each fitted with 30 kW of heating elements in two banks. The temperature is thermostatically controlled to 150 deg F, half the elements cutting out at 140 deg F. The machines are push-button operated and will operate only if the door is properly closed. A fluff extractor is included. Illuminating the laundry are fifteen 80-W G.E.C. fluorescent tubes.

The flats are fed at 415/240 V by means of rising mains, 3-phase distribution boards being installed on half landings with bus-bars in the centre and fuses on either side. The panel in the meter cupboard of each flat is fitted ready drilled to accommodate any type of meter. The London Electricity Board prepared the electrical specifications for the flats and also carried out the complete laundry installation. The electrical contractors for the flats were S. Goodchild.

"Britain Goes Ahead" Exhibition

SOME ways in which Britain is regaining supremacy in industrial and scientific invention are used to support the call for increased productivity in "Britain Goes Ahead," the last of a series of economic exhibitions at Charing Cross London Transport Station, where nearly 400,000 people have already seen the previous displays.

Among the many interesting exhibits are a "pictures by wire" installation which can receive and transmit photographs to and from anywhere in the world in ten minutes; radar apparatus; television sets; a supersonic flaw detector which detects imperfections in steel and other metals; an instrument gauge tester which automatically gauges machine parts to 0.00011in; electro-medical apparatus; and fluorescent street-lighting fittings.

Electricity Supply

Trunk Road Lighting : Australian Plant Programme

Barrow-in-Furness.—UNDERTAKING'S REPORT.—The 1947-48 report of the former undertaking refers to the scheme for the construction of a 120,000-kW generating station on Roosecote Marsh, preliminary work on which has already started. Mention is also made of the report by the undertaking's consultants on the proposed establishment of hydro-electric works in the Lakeland area which has been passed to the B.E.A. for consideration. At the existing Coniston Water power station over a million kWh was generated last year at a cost, including capital charges, of less than 0.2d per kWh.

Crewkerne (Somerset).—STREET LIGHTING CONVERSION.—The chairman of the Urban District Council (Mr. L. N. Deeley) recently performed the switching-on ceremony for a new street lighting scheme on the trunk route A30, which passes through the town. Some thirty-seven 250 MA/H discharge lamps in "Dioptrion" fittings are mounted on either brackets or concrete columns and the lighting is to the Ministry of Transport's requirements for trunk routes. The Council is proposing to convert the whole of the street lighting in the town from gas to electricity and the section just switched on represents the completion of the first stage; the remainder of the project will be spread over three years. The council placed the contract for the present scheme with the General Electric Co., Ltd., and the officials of the South Somerset area of the South-Western Electricity Board acted as general advisers. The use of electricity for street lighting was first proposed as far back as 1929, but it was not until 1946 that the Council finally decided to make the change; then, after some 20 months of "paper work," the actual installation was carried out in less than three weeks.

Enfield. — PROPOSED EXTENSIONS AT BRIMSDOWN.—The Urban District Council reports that notice has been given by the British Electricity Authority of a proposed extension to the Brimsdown generating station covering the installation of a 60,000-kW turbo-alternator and two 360,000-lb-per-hr boiler units and the construction of two cooling towers, together with the necessary buildings and civil engineering works. A formal objection is being lodged on behalf of the Council, and the engineer has been instructed to ascertain whether soot and smoke abatement installations incorporated in the proposed scheme are in operation elsewhere in the country, and whether they can be inspected.

Hull.—ANNUAL REPORT.—The last annual report of the electricity undertaking under municipal control covers the fifty-fifth year of operation. The number of kWh generated amounted to 519.6 million (16.3 per cent increase on 1946-47) and 361.2 million kWh was sold (4.4 per cent increase). At the end of March last there were 101,594 consumers, an addition of 3,898 during the year. Income totalled £1,540,623 and there was a small profit (£555) on the year's working. The average price received per kWh was 0.968d.

Overseas

Australia. — PLANT EXTENSION PROGRAMME.—New plant and extensions planned for major supply undertakings in Australia during the next seven years are reviewed in an article in the *Electrical Engineer and Merchandiser* (Melbourne). This puts the present total capacity at 1,851,250 kW and the estimated capacity in 1955 at 3,323,100, an increase of 80 per cent. On the basis of a total population in the Commonwealth of 7,650,000, the existing capacity is equal to 0.24 kW per head, and taking the 1955 population as 8,200,000, the capacity per head will be 0.40 kW.

United States.—TRANSPORTING 100,000-kW STATOR.—The completely assembled stator of a 100,000-kW generator was recently transported from the General Electric works at Schenectady to the station "P" steam plant of the Pacific Gas & Electric Co. at San Francisco. A specially built trailer with 74 rubber-tyred wheels was used, the truck weighing 55 tons and the load 178 tons. According to *Electrical West*, this is the first time that a unit of such a size has been moved completely assembled.

Electricity Output

THE output of solid-fuel fired generating stations in the week ended 19th November was 882.4 million kWh, as compared with 934.6 million kWh in the preceding week and 903.3 million for the week ended 21st November, 1947. Stocks of coal at electricity undertakings at 20th November totalled 4,475,200 tons.

Magnetic Amplifier

ALTERNATIVE TO THE VACUUM TUBE

THE thermionic vacuum tube is now familiar as an effective device for amplifying small a.c. electrical signals many times over. When it is employed for the amplification of low-frequency fluctuations (or d.c. as they are sometimes termed) the results are not nearly so gratifying, and the minimum value of such signals that can be detected is much greater than for signals consisting of higher frequency components.

At present, frequency conversion devices of different types are widely used for the successful amplification of low-frequency d.c. signals. The function of the convertor or modulator is to generate a h.f. signal, the instantaneous peak amplitude of which, at any moment, is proportional to the level of the signal at that instant. This signal is then amplified in the conventional way by means of an electronic circuit. It may then be detected or demodulated, giving an amplified version of the original signal. Mechanical, electro-mechanical and magnetic modulators, together with several other types, are employed for frequency conversion.

Principle of Device

To overcome the inherent difficulties obtaining when the electronic d.c. amplifier is utilized, a device has been evolved during the past few years. It is a development of the well-known saturable reactor used for the control of stage lighting equipment, and it is becoming known in its present form as the magnetic amplifier. The signal to be amplified is applied to a coil wound on a core of some suitable ferro-magnetic material, and the current thus generated in the coil causes a slight polarization of the core material. A comparatively heavy current at a frequency of, say, 1,500 c/s is passed through another coil wound on the same core and it is of sufficient magnitude to cause saturation of the core material. The polarization due to the signal causes a second harmonic frequency of 3,000 c/s to be produced, the amplitude of which varies in sympathy with the signal level. This harmonic is amplified by means of a high gain electronic amplifier and is reconverted to signal frequency by a detector.

An instrument has been constructed on this principle capable of detecting signal powers of the order of 1×10^{-17}W, at frequencies below 10 c/s. It is primarily intended to operate from a low impedance signal source, e.g., a thermocouple, and it has, therefore, many applications in the industrial field, such as in the precise control of temperature, and probably also in biological research.

Many Applications

A new science and art are rapidly developing around the design and use of this device. It will perform many functions, which cannot be efficiently carried out by electronic means, and it will do so with greater accuracy and reliability.

There are no glass parts, thin filaments or grids, and it may be used at a moment's notice, as no warming-up time is necessary. The active parts comprise the laminations, windings and associated metal rectifiers in the modulator circuit. It can be used as a d.c. amplifier and as a d.c./a.c. invertor-amplifier. A number of d.c. signals can be accepted on windings which can be completely isolated from one another and from the output circuit. It has also been claimed that it is unaffected by nuclear radiation.

When used as a d.c. amplifier the small output from a photocell or thermocouple can be made to operate an industrial type of meter instead of the delicate galvanometer which is normally necessary. The output can be taken to to a relay which can be made to open or close at predetermined values. Alternatively, it may be fed into the armature or field circuits of a d.c. motor to control speed or direction of rotation. Equipment has been constructed in this country whereby the variations of light falling on a photocell cause the motor to reverse its direction of rotation.

By employing the magnetic amplifier, speeds of feed for continuous processes

can be maintained to an accuracy of 0.1 per cent without the use of centrifugal or other mechanical governors. An a.c. voltage taken from some rotating component is used as a reference frequency and passed through two tuned circuits supplying the signal to the magnetic amplifier. The output from the amplifier is taken to a motor winding and the whole connected in such a way that the changes of frequency cause changes in the signal winding currents. The amplified effect of these changes passed to the motor winding is applied to bring about a correction of deviation. The addition of a circuit giving derivative feedback results in a steady control free from hunting troubles.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

Ferranti, Ltd.—Speaking at the annual meeting held on 18th November, Sir Vincent de Ferranti (chairman and managing director) said that the considerable increase in the current assets of the subsidiary companies was an indication of the continued expansion in the business of the Canadian company, which increased its output by 50 per cent over the previous year. During the year the output of their commercial departments had increased 20 per cent. Whereas last year all departments contributed to this increase, this year there was a sharp division between those departments producing transformers, electricity service meters, instruments and castings for the electricity supply industry and those producing radio, television, domestic appliances and clocks for the general public. In the former there had been marked increases in turnover, and in the latter marked decreases. Orders received included two 75,000 kVA generator transformers for the new Carrington power station at Manchester, three 58,500 kVA generator transformers for the Braehead station, Glasgow, and two 66,000 kVA units for the new Deptford station. An order had been received for two 100,000 kVA 132 kV transformers with on-load tap changing gear for the British Electricity Authority, the largest units bought for use in Great Britain. The total volume of their export orders showed an increase of three and a half times over that of the last year before the war, and 40 per cent of their commercial output had been exported. The output of the meter department had been a record both in numbers and value. The demand for radio, valves, and clocks had been curtailed by economic policy, and that for electric fires and water heaters as the result of the shortage of generating plant. This decline became apparent in March and so had only been effective for one quarter of the financial year. It was likely to have a much more serious effect on next year's results. In addition the demand for electricity meters had decreased in recent months. They hoped that by making economies and greatly increasing their output of heavy plant, they would surmount their difficulties.

The British Electric Resistance Co., Ltd., reports a net profit for the year to 31st July last of £20,297, as compared with a loss of £4,236 for the preceding year. After providing for taxation and placing £4,201 to reserve, it is proposed to pay a final dividend of 15 per cent, making 20 per cent for the year (against nil). The balance carried forward is £6,911 (against £12,295 brought in).

Heenan & Froude, Ltd., report a net profit for the year ended 31st August last of £72,647, as compared with £10,012 for the previous year, to which are added £2,355, provisions no longer required, and £47,423 brought in, making £122,425 available. After making provisions for deferred repairs and obsolescence and replacement reserve, it is proposed to pay a final ordinary dividend of 10 per cent, making 15 per cent for the year (same) and to carry forward £61,496.

S. Smith & Sons (England), Ltd., report consolidated profits for the year to 31st July of £857,844, as compared with £686,508 for the previous year, and a consolidated net profit of £317,768 (against £276,084). The net profit of the parent company is £225,435 (against £135,543). The final dividend on the preferred ordinary is 10½ per cent, making 17½ per cent, less tax, for the year, and the first and final dividend for the year on the deferred ordinary is 37½ per cent, less tax. These payments are the same as for the previous year.

Joseph Lucas, Ltd., report a consolidated profit for the year to 31st July, including subsidiaries covering periods varying from twelve to nineteen months, of £2,914,370. Comparison with the previous year is not possible. United Kingdom

income tax and profits tax requires £2,080,695, Dominions taxes £26,149, and additional United Kingdom income tax £299,977, leaving £507,549, to which is added other revenue, making £640,702 available. The net profit of the parent company is £398,416. The final ordinary dividend is 12½ per cent, maintaining the distribution for the year at 17½ per cent, reserve receives £100,000, and employees' fund £25,000. The balance carried forward is £206,905 (against £142,752 brought in).

Thomas de la Rue & Co., Ltd., have declared an interim dividend of 15 per cent, less tax (against 10 per cent). The directors state that the increased interim is due to a desire to reduce the disproportion between interim and final dividends and should not be taken as an indication that the rate of dividend for the year will be increased.

Lightalloys, Ltd., reports a net profit for the year ended 27th June last of £35,394, as compared with £14,510 for the preceding year. The final dividend is 10 per cent, maintaining the distribution for the year at 15 per cent.

Cape Electric Tramways, Ltd., reports a profit for the year ended 30th June last of £59,474, as compared with £70,254 for 1946-47, to which is added £16,431 brought in. Revenue reserves receive £20,000 and the dividend for the year is maintained at 6 per cent. The balance carried forward is £20,537.

Electric & Musical Industries, Ltd., report a consolidated trading profit for the year to 30th June last of £1,232,752, an increase of £377,668 as compared with the preceding year, and after providing for staff pensions, depreciation, profits tax, etc., there is a net profit of £498,192 (against £117,335). The ordinary dividend for the year is maintained at 6 per cent, but in addition a bonus of 2 per cent is paid. A sum of £350,000 has been placed to general reserves of subsidiary companies and £449,045 is carried forward (against £443,759 brought in).

The Radio & Television Trust, Ltd., is again paying a dividend of 25 per cent for the year.

W. & T. Avery, Ltd., are again paying an interim dividend of 5 per cent.

Richard Crittall & Co., Ltd.—The Board of Trade has announced that pursuant to the powers conferred upon it by the Companies Act, 1948, an official inspection of this company's affairs is to be held, and Mr. J. C. Burleigh, of Thomson, McLintock & Co., has been appointed as the official inspector.

New Companies

West & Turner, Ltd.—Registered 18th November. Capital £1,000. Electrical, wireless, television, constructional and mechanical engineers, etc. Permanent directors: D. C. Turner and L. F. West. Secretary: L. H. Wilson. Regd. office: 15a, Clarence Terrace, High Street, Barkingside, Essex.

Grafton, Kersten & Co., Ltd.—Registered 18th November. Capital £100. Electrical, mechanical and general engineers, electrical component and general implement makers, etc. Directors: C. Grafton, L. Kersten and E. D. Singer. Secretary: C. Grafton. Regd. office: 47, Oxford Street, W.1.

Emitron Television, Ltd.—Registered 25th November. Capital £100. Manufacturers, importers and exporters of and dealers in television apparatus of all kinds, etc. Subscribers: W. G. Hart, 31, Coniston Road, Muswell Hill, N.10, and W. C. Waterlow, 16, Sherwood Road, S. Harrow. Regd. office: Blyth Road, Hayes, Mdx.

Panks Radio, Ltd. — Registered 2nd November. Capital, £5,000. Manufacturers and repairers of, and dealers in, radio and television sets and accessories, etc. Directors: H. A. Pank, J. C. Pank, R. M. Pank, Mrs. Vera E. Pank and Mrs. Doreen J. Pank. Regd. office: 12, Orford Place, Norwich.

Liquidations

The Jarrow and District Electric Traction Co., Ltd.—Members' voluntary winding-up. Joint liquidators, Mr. E. E. Johnson, Omnibus Garage, Queen Street, Bensham, Co. Durham, and Mr. I. M. Smith, 88, Kingsway, London, W.C.2.

The Worth Electrical Services Co., Ltd. —Winding up voluntarily. Liquidator, Mr. T. W. Hutt, 29, Randall Road, Leatherhead.

Bankruptcies

E. Marrow, residing at 131, King Street, Knutsford, and carrying on business at 123, King Street, Knutsford, Cheshire, under the style of Marrows Radio Service, electrical and radio engineer.—Trustee, Mr. F. C. Ormrod, 20, Byrom Street, Manchester, Official Receiver, released 5th November, 1948.

R. Hampson, Yew Tree Bungalow, Hall'ith Wood, Astley Bridge, Bolton, electrical engineer and lately trading with A. Mearns as the Northern Supply Co., at 28, Victoria Square, Bolton, electrical engineers.—Last day for receiving proofs for dividend, 10th December. Trustee, Mr. F. C. Ormrod, 20, Byrom Street, Manchester, 3, Official Receiver.

STOCKS and SHARES

PRICES of securities hold their ground with a tenacity which, even in market circles, occasions a measure of surprise to those who view with misgiving the course of economic and political developments. Others, with an eye on the record figure of six billions for bank deposits, the perceptible improvement in this country's balance of trade, and the comparative lull in international tension, are prepared to see quotations at least maintained for some time to come. Prices have travelled a long way and over a broad front since midsummer when British Transport threes stood at 96, against 99⅞ ex dividend now; and General Electric ordinary were well below their present price of 90s. British Electricity threes are little short of the best price touched, 103 and the partly paid scrip is steady at 1 11/16 premium.

Month's Changes

A sharp rise in Aberdare Cables was checked by the report of a capital issue. After being 67s. the shares are 1s. 9d. higher on the month at 65s. The accompanying price-lists record, for the second successive month, a general and emphatic improvement. Most of the leaders have added two or three shillings, yields shrinking in several cases to well under the 4 per cent mark. E.M.I. have reacted 1s. to 18s. 6d., after their response to the good results, but Pye and Decca have each gained a florin. Hoovers recovered half a crown to 37s. 6d. from the depressing effect of the recent new issue.

Tube Investments, 6 9/16, have added 2s. 6d. to the previous month's rise of 6s. 3d. Outside the electrical equipment market, Tillings finished 4s. 6d. to the good at 122s. A fall of $5 in I.T.T. speaks for Wall Street's reaction to the Presidential Election result.

Radio & Television Trust

In response to last week's announcements, the 2s. shares of the R.T.T. company hardened to 6s. 6d., after crossing 7s. A month ago they were 5s. The market read a favourable interpretation into the decision to sell the Perivale factory, and to discontinue the manufacture and sale of domestic radio sets. In addition, expectations were exceeded by the 25 per cent dividend (against nil last time), and by the group profit of over £300,000 from business outside the radio sector. Losses involved in closing the latter are offset to a large extent by profit on the factory sale. The 6 per cent preference shares have improved to 18s. 6d. Scophony, at 1s. 9d., are 3d. up: the company has now acquired John Logie Baird, Ltd., and W. Andrew Bryce & Co., Ltd. The purchase is to be satisfied by the allotment of two million fully paid 1s. Scophony shares.

Crompton Parkinson

This company's final dividend for the year to September last is due before the end of the year. The million new "A" shares issued in May qualify this time for their first dividend payment. They were offered to stockholders at 20s. which is 7s. 6d. below to-day's price, and contributed part of the £1½ million required to finance the re-equipment and expansion programme: the balance is to accrue from further conservation of resources. At the time of the issue the directors expected to be able to make the same rate of distribution as before. This was 22½ per cent (including 7½ per cent. bonus) and indicates a yield of £4 1s. 10d. per cent on the shares.

Lines on Offer

Crabtree Electrical Industries 10s. shares seldom come on offer in large numbers, but a thousand are currently available at 43s. 3d., ex the second 5 per cent interim dividend paid by the company pending completion of the full accounts. These have been delayed by presentation of the figures in the form now required by the Companies Act. In due course it is proposed to make a final distribution. On last year's total of 17½ per cent (including 7½ as bonus) the yield is £4 1s. per cent. A line of Dewhurst & Partners 2s. shares is offered at 8s. 3d., including the final dividend declared last week. They were introduced to the market at 1s. below the present price early this year. The total payment of 30 per cent agrees with estimates in the particulars published at the time of the introduction. Profits, however, have come out some 50 per cent higher than the forecast. The return is 7¼ per cent.

Preference Shares

A substantial block of G.E.C. 4¼ per cent preference is in the market at 23s. 9d., paying a modest £3 11s. 6d. per cent on the money. Others on offer in the semi-gilt-edged class include the 4 per cent preference stocks of Automatic Telephone at 23s., and Reyrolle at 22s., the yields being respectively a little under and a little over 3½ per cent. A return of £3 16s. 3d. per cent can be obtained from Electrical Switchgear and Walsall Conduits 5 per cents, at 26s. 3d. each. English Electric 6½ per cents at 35s., and A.E.I. "eights" at 42s. 3d., both pay approximately 3¾ per cent. Hackbridge Cable 5 per cent preference are 24s. 9d., yielding just over 4 per cent. In the higher ranges are Brush 5½ per cents which, at 21s., return nearly 5¼ per cent.

income tax and profits tax requires £2,080,695, Dominions taxes £26,149, and additional United Kingdom income tax £299,977, leaving £507,549, to which is added other revenue, making £640,702 available. The net profit of the parent company is £398,416. The final ordinary dividend is 12½ per cent, maintaining the distribution for the year at 17½ per cent, reserve receives £100,000, and employees' fund £25,000. The balance carried forward is £206,905 (against £142,752 brought in).

Thomas de la Rue & Co., Ltd., have declared an interim dividend of 15 per cent, less tax (against 10 per cent). The directors state that the increased interim is due to a desire to reduce the disproportion between interim and final dividends and should not be taken as an indication that the rate of dividend for the year will be increased.

Lightalloys, Ltd., reports a net profit for the year ended 27th June last of £35,394, as compared with £14,510 for the preceding year. The final dividend is 10 per cent, maintaining the distribution for the year at 15 per cent.

Cape Electric Tramways, Ltd., reports a profit for the year ended 30th June last of £59,474, as compared with £70,254 for 1946-47, to which is added £16,431 brought in. Revenue reserves receive £20,000 and the dividend for the year is maintained at 6 per cent. The balance carried forward is £20,537.

Electric & Musical Industries, Ltd., report a consolidated trading profit for the year to 30th June last of £1,232,752, an increase of £377,668 as compared with the preceding year, and after providing for staff pensions, depreciation, profits tax, etc., there is a net profit of £498,192 (against £117,335). The ordinary dividend for the year is maintained at 6 per cent, but in addition a bonus of 2 per cent is paid. A sum of £350,000 has been placed to general reserves of subsidiary companies and £449,045 is carried forward (against £443,759 brought in).

The Radio & Television Trust, Ltd., is again paying a dividend of 25 per cent for the year.

W. & T. Avery, Ltd., are again paying an interim dividend of 5 per cent.

Richard Crittall & Co., Ltd.—The Board of Trade has announced that pursuant to the powers conferred upon it by the Companies Act, 1948, an official inspection of this company's affairs is to be held, and Mr. J. C. Burleigh, of Thomson, McLintock & Co., has been appointed as the official inspector.

New Companies

West & Turner, Ltd.—Registered 18th November. Capital £1,000. Electrical, wireless, television, constructional and mechanical engineers, etc. Permanent directors: D. C. Turner and L. F. West. Secretary: L. H. Wilson. Regd. office: 15a, Clarence Terrace, High Street, Barkingside, Essex.

Grafton, Kersten & Co., Ltd.—Registered 18th November. Capital £100. Electrical, mechanical and general engineers, electrical component and general implement makers, etc. Directors: C. Grafton, L. Kersten and E. D. Singer. Secretary: C. Grafton. Regd. office: 47, Oxford Street, W.1.

Emitron Television, Ltd.—Registered 25th November. Capital £100. Manufacturers, importers and exporters of and dealers in television apparatus of all kinds, etc. Subscribers: W. G. Hart, 31, Coniston Road, Muswell Hill, N.10, and W. C. Waterlow, 16, Sherwood Road, S. Harrow. Regd. office: Blyth Road, Hayes, Mdx.

Panks Radio, Ltd. — Registered 2nd November. Capital, £5,000. Manufacturers and repairers of, and dealers in, radio and television sets and accessories, etc. Directors: H. A. Pank, J. C. Pank, R. M. Pank, Mrs. Vera E. Pank and Mrs. Doreen J. Pank. Regd. office: 12, Orford Place, Norwich.

Liquidations

The Jarrow and District Electric Traction Co., Ltd.—Members' voluntary winding-up. Joint liquidators, Mr. E. E. Johnson, Omnibus Garage, Queen Street, Bensham, Co. Durham, and Mr. I. M. Smith, 88, Kingsway, London, W.C.2.

The Worth Electrical Services Co., Ltd. —Winding up voluntarily. Liquidator, Mr. T. W. Hutt, 29, Randall Road, Leatherhead.

Bankruptcies

E. Marrow, residing at 131, King Street, Knutsford, and carrying on business at 123, King Street, Knutsford, Cheshire, under the style of Marrows Radio Service, electrical and radio engineer.—Trustee, Mr. F. C. Ormrod, 20, Byrom Street, Manchester, Official Receiver, released 5th November, 1948.

R. Hampson, Yew Tree Bungalow, Hall'ith Wood, Astley Bridge, Bolton, electrical engineer and lately trading with A. Mearns as the Northern Supply Co., at 28, Victoria Square, Bolton, electrical engineers.—Last day for receiving proofs for dividend, 10th December. Trustee, Mr. F. C. Ormrod, 20, Byrom Street, Manchester, 3, Official Receiver.

STOCKS and SHARES

PRICES of securities hold their ground with a tenacity which, even in market circles, occasions a measure of surprise to those who view with misgiving the course of economic and political developments. Others, with an eye on the record figure of six billions for bank deposits, the perceptible improvement in this country's balance of trade, and the comparative lull in international tension, are prepared to see quotations at least maintained for some time to come. Prices have travelled a long way and over a broad front since midsummer when British Transport threes stood at 96, against 99⅞ ex dividend now; and General Electric ordinary were well below their present price of 90s. British Electricity threes are little short of the best price touched, 103 and the partly paid scrip is steady at 1⅛ premium.

Month's Changes

A sharp rise in Aberdare Cables was checked by the report of a capital issue. After being 67s. the shares are 1s. 9d. higher on the month at 65s. The accompanying price-lists record, for the second successive month, a general and emphatic improvement. Most of the leaders have added two or three shillings, yields shrinking in several cases to well under the 4 per cent mark. E.M.I. have reacted 1s. to 18s. 6d., after their response to the good results, but Pye and Decca have each gained a florin. Hoovers recovered half a crown to 37s. 6d. from the depressing effect of the recent new issue.

Tube Investments, 6⅞, have added 2s. 6d. to the previous month's rise of 6s. 3d. Outside the electrical equipment market, Tillings finished 4s. 6d. to the good at 122s. A fall of $5 in I.T.T. speaks for Wall Street's reaction to the Presidential Election result.

Radio & Television Trust

In response to last week's announcements, the 2s. shares of the R.T.T. company hardened to 6s. 6d., after crossing 7s. A month ago they were 5s. The market read a favourable interpretation into the decision to sell the Perivale factory, and to discontinue the manufacture and sale of domestic radio sets. In addition, expectations were exceeded by the 25 per cent dividend (against nil last time), and by the group profit of over £300,000 from business outside the radio sector. Losses involved in closing the latter are offset to a large extent by profit on the factory sale. The 6 per cent preference shares have improved to 18s. 6d. Scophony, at 1s. 9d., are 3d. up: the company has now acquired John Logie Baird, Ltd., and W. Andrew Bryce & Co., Ltd. The purchase is to be satisfied by the allotment of two million fully paid 1s. Scophony shares.

Crompton Parkinson

This company's final dividend for the year to September last is due before the end of the year. The million new "A" shares issued in May qualify this time for their first dividend payment. They were offered to stockholders at 20s. which is 7s. 6d. below to-day's price, and contributed part of the £1½ million required to finance the re-equipment and expansion programme: the balance is to accrue from further conservation of resources. At the time of the issue the directors expected to be able to make the same rate of distribution as before. This was 22½ per cent (including 7½ per cent. bonus) and indicates a yield of £4 1s. 10d. per cent on the shares.

Lines on Offer

Crabtree Electrical Industries 10s. shares seldom come on offer in large numbers, but a thousand are currently available at 43s. 3d., ex the second 5 per cent interim dividend paid by the company pending completion of the full accounts. These have been delayed by presentation of the figures in the form now required by the Companies Act. In due course it is proposed to make a final distribution. On last year's total of 17½ per cent (including 7½ as bonus) the yield is £4 1s. per cent. A line of Dewhurst & Partners 2s. shares is offered at 8s. 3d., including the final dividend declared last week. They were introduced to the market at 1s. below the present price early this year. The total payment of 30 per cent agrees with estimates in the particulars published at the time of the introduction. Profits, however, have come out some 50 per cent higher than the forecast. The return is 7½ per cent.

Preference Shares

A substantial block of G.E.C. 4½ per cent preference is in the market at 23s. 9d., paying a modest £3 11s. 6d. per cent on the money. Others on offer in the semi-gilt-edged class include the 4 per cent preference stocks of Automatic Telephone at 23s., and Reyrolle at 22s., the yields being respectively a little under and a little over 3½ per cent. A return of £3 16s. 3d. per cent can be obtained from Electrical Switchgear and Walsall Conduits 5 per cents, at 26s. 3d. each. English Electric 6½ per cents at 35s., and A.E.I. "eights" at 42s. 3d., both pay approximately 3¾ per cent. Hackbridge Cable 5 per cent preference are 24s. 9d., yielding just over 4 per cent. In the higher ranges are Brush 5½ per cents which, at 21s., return nearly 5¼ per cent.

Electrical Investments

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 29 Nov. 1948	Month's Rise or Fall	Yield p.c.
Overseas Electricity Companies					£ s. d.
Atlas Elec. ...	Nil	2	13/9	−3d.	2 18 0
Calcutta Elec. ...	6†	6†	33/–	−6d.	3 12 9
Cawnpore Elec. ...	13	13	40/–	...	6 10 0
East African Power	7	7	46/6	+6d.	3 0 4
Jerusalem Elec. ...	5	6	16/3	−¼	7 7 8
Madras Elec. ...	8	5	37/6	...	2 13 2
Nigerian Elec. ...	12½	10	36/–	+6d.	5 11 1
Palestine Elec. "A"	7†	Nil	27/6	−¼	—
Perak Hydro-elec.	Nil	Nil	12/6	...	—
Whitehall Inv. Pref.	—	6	25/6	...	4 14 1
Equipment and Manufacturing					
Aberdare Cable ...	10	15	65/–	+1/9	4 12 4
Aron Elec. Ord. ...	15	15	50/–	...	6 0 0
Assoc. Elec. Ord. ...	15	15	78/3	+3/3	3 17 0
Automatic Tel. & El.	12½	12½	63/3	...	3 19 1
Babcock & Wilcox	15	15	71/9	+3d.	4 3 4
Baldwin, H. J. (2/–)	25	25	8/9	−6d.	5 14 3
British Aluminium	10	10	49/3	+1/9	4 1 4
B.I. Callender's ...	6¾	6¾	36/6	+2/6	3 13 0
British Thermostat (5/–)	23½	23½	26/9	...	4 7 9
British Vac. Cleaner (5/–)	20	20	13/–	+9d.	7 13 10
Brush Ord. (5/–) ...	—	—	7/6	+1/–	—
Burco (5/–) ...	35	35	24/6	...	7 3 0
Chloride El. Storage	20	20	100/–	...	4 0 0
Cole, E. K. (5/–) ...	20	22½	15/6	...	7 5 2
Cossor, A. C. (5/–)...	25	Nil	11/–	...	—
Crabtree (10/–) ...	17½	17½	43/–	...	4 1 5
Crompton Parkinson Ord. (5/–) ...	22½	22½	27/6	+6d.	4 1 10
De La Rue (5/–) ...	50	50	36/3	−9d.	6 18 0
Decca (1/–) ...	112½	112½	22/6	+2/–	5 0 0
E.M.I. (10/–) ...	6	8	18/6	−1/–	4 6 6
Electrical Components (5/–) ...	20	20	12/6	...	8 0 0
Elec. Construction	12½	12½	53/9	+⅜	4 13 0
Enfield Cable Ord.	7½	7½	36/–	+6d.	4 3 4
English Electric ...	10	10	49/6	+2/–	4 1 0
Ericsson Tel. (5/–)...	20†	20†	45/–	+6d.	2 4 6
Ever Ready (5/–)...	40	40	37/–	−1/–	5 8 1
Falk Stadelmann...	10	15	43/9	−⅛	6 17 0
G.E.C. Ord. ...	17½	17½	90/–	+2/6	3 17 9
General Cables (5/–)	25	50	37/6	...	6 13 4
Greenwood & Batley	15	15	52/6	...	5 14 3
Hackbridge Cable (5/–)	—	20(est.)	15/9	+⅛	—
Hackbridge Hewittic (5/–)	6	12	11/6	+6d.	5 4 4
Hall's Tel. Acc. (10/–)	10	10	13/3	+9d.	7 11 0
Heatrae (2/–) ...	12½	12½	5/–	...	5 0 0
Henley's (5/–) ...	20	20	25/–	...	4 0 0
Hoover (5/–) ...	40	40	37/6	+2/6	5 6 8
Intl. Combustion (5/–)	37½	37½	46/3	+⅜	4 1 6
Johnson & Phillips	15	15	70/6	+6d.	4 5 3

Company	Dividend Previous	Dividend Last	Middle Price 29 Nov. 1948	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (Continued)					£ s. d.
Lancashire Dynamo	22½	22½	5½	+⅛	4 5 9
Laurence, Scott (5/–)	12½	12½	15/–	+6d.	4 3 4
London Elec. Wire	10	10	47/6	...	4 4 2
J. Lucas	17½	17½	85/–	+½	4 2 5
Mather & Platt ...	11	11	53/9	+1/9	4 1 9
Metal Industries (B)	10	10	49/6	+⅜	4 1 0
Mid. Elec. Mfg. ...	35	35	8½	...	4 5 0
Murex	20	20	97/6	+5/–	4 2 0
Newman Ind. (2/–)	22½	22½	16/9	...	6 13 6
Oldham & Son (1/–)	60	60	11/–	+3d.	5 9 0
Plessey (5/–) ...	30	20	17/6	+⅜	5 14 3
Parsons C. A. ...	12½	12½	62/–	...	4 0 8
Pye Deferred (5/–)	25	25	28/3	+2/–	4 8 6
Radio & Tel. (2/–)	40	25	6/6	+1/6	7 13 10
Revo (10/–) ...	27½	27½	60/9	+⅜	4 10 6
Reyrolle	12½	12½	62/6	+⅜	4 0 0
Scophony (5/–) ...	—	—	1/9	+3d.	—
Scot. Cable (4/–) ...	30	30	24/3	+1/–	—
Siemens Ord. ...	7½	7½	36/–	+1/6	4 3 4
Switchgear & Cowans (5/–)	10	20	17/6	+1/–	5 14 3
T.C.C. (10/–) ...	15	15	32/6	...	4 12 4
T.C. & M.	10	10	47/6	+3/6	4 4 2
Telephone Mfg. (5/–)	9	9	10/3	+9d.	4 7 10
Thorn Elec. (5/–) ...	25	25	20/–	+⅜	6 5 0
Tube Investments...	25	25	6-⅜	+½	3 16 3
Vactric (5/–) ...	Nil	Nil	12/–	+2/–	—
Veritys (5/–) ...	2½	5	5/–	+1/–	5 0 0
Walsall Conduits (4/–)	70	70	57/6	+⅛	4 17 3
Ward & Goldstone (5/–)	50	50	59/–	...	4 4 9
Watford (2/–) ...	15	15	5/9	...	5 4 4
Westinghouse Brake	14	14	68/9	+⅜	4 1 5
West, Allen (5/–) ...	10	10	11/–	+6d.	4 11 0
Transport and Communications					
Anglo-Am. Tel.: Pref.	6	5-⅝	117½	...	—
Def.	1½	1½*	22½	...	—
Anglo-Portuguese...	8	8	30/–	...	5 6 8
Brit. Elec. Traction: Def. Ord. ...	50	50	1925	−40	2 12 1
Calcutta Trams ...	10	Nil	28/6	−3/–	—
Cape Elec. Trams...	6	6	27/6	−½	4 7 3
Cable & Wireless: 5½ Pref.	5½	5½	126½	−2	4 7 0
Ord.	4	4	213½	+3	—
Globe Tel. & Tel. Ord.	5†	5†	50/–	+2/–	2 0 0
Great Northern Tel. (£10)	15	12	21	...	5 14 3
Inter. Tel. & Tel....	Nil	Nil	15	−5	—
Marconi-Marine ...	7½	7½	31/6	+6d.	4 15 3
Oriental Tel. Ord....	10	16	51/3	−2/9	6 5 0
Telephone Props. ...	6	6	17/6	...	6 17 2
Tele. Rentals (5/–)	10	10	11/–	...	4 11 0
T. Tilling	10	10	122/–	+4/6	—

* Dividend postponed.

† Dividends are paid free of Income Tax.

Next Week's Events

Monday, 6th December

BIRMINGHAM.—James Watt Memorial Institute, 6 p.m. I.E.E. South Midland Centre. "Some Projects favourable to Direct-Current Transmission and the Role of the British Electrical Industry in Relation thereto," by F. J. Erroll and Lord Forrester.

LIVERPOOL.—Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey and North Wales Centre. "Survey of Metering Practice on the British Grid System," by F. Byrne.

LONDON.—At the Institution of Electrical Engineers, Savoy Place, W.C.2, 5 p.m. Institution of Post Office Electrical Engineers. "The Cables of the Inland Long-Distance Telecommunications Network and their Maintenance," by H. C. S. Hayes and E. D. Latimer.

SHEFFIELD.—Royal Victoria Hotel, 7.30 p.m. A.S.E.E. Sheffield Branch. "Utilization of Light," by J. A. Whittaker.

Tuesday, 7th December

CAMBRIDGE.—Cavendish Laboratory, 8.15 p.m. I.E.E. Cambridge Radio Group. "Three Dimensional Cathode-Ray-Tube Displays," by E. Parker and P. R. Wallis.

ELTHAM.—Castle Hotel, High Street, 8 p.m. A.S.E.E. South-East London Branch. Competition papers night.

HAMMERSMITH.—Town Hall, King Street, 7.30 p.m. A.S.E.E. West London Branch. "Time and Motion Study in the Electrical Industry."

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Joint meeting of the I.E.E. Measurements and Supply Sections. "The Application of the Recurrent Surge Oscillograph to the Study of Surge Phenomena in Transformers," by E. L. White and W. Nethercot, and "An Oscillograph for Automatic Recording of Disturbances on Electric Supply Systems," by W. T. J. Atkins.

Paddington Technical College, 7.30 p.m. Institute of Marine Engineers. "The Use of Electricity at Sea," by C. P. Harrison.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Centre. "Some Projects favourable to Direct-Current Transmission and the Role of the British Electrical Industry in Relation thereto," by F. J. Erroll and Lord Forrester.

Wednesday, 8th December

ABERDEEN.—Caledonian Hotel, 7.30 p.m. I.E.E. North-East Scotland Sub-Centre. "Standardization of Switchgear," by D. E. Lambert and J. Christie.

BRIDGEND.—At the Mining and Technical Institute, 7 p.m. Illuminating Engineering Society (Cardiff Centre). "The Manufacture of Tungsten Filament and Electric Discharge Lamps," by S. G. Turner and W. A. Cooper.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Supply Section. "Factors Influencing the Design of High-Voltage Air-Blast Circuit Breakers," by C. H. Flurscheim and E. L. L'Estrange.

Gas Industry House, 1, Grosvenor Place, S.W.1, 6 p.m. Illuminating Engineering Society. Reports and discussion on the 1948 meeting of the International Commission on Illumination.

WEYMOUTH.—Royal Hotel, 6.30 p.m. I.E.E. Southern Centre. "The Electrical Measurement of Pressure and Strain with Particular Reference to the Testing of Circuit-Breakers," by R. W. Wild.

Thursday, 9th December

DUNDEE.—Royal Hotel, Union Street, 7 p.m. I.E.E. North-East Scotland Sub-Centre. "Standardization of Switchgear," by D. E. Lambert and J. Christie.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilization Section. "Polyphase Commutator Machines," by B. Adkins and W. J. Gibbs.

PALMERS GREEN.—Lacey Hall, Hazelwood Lane, 8 p.m. A.S.E.E. North London Branch. "Some Aspects of Frequency Modulation," by P. E. F. A. West.

SWANSEA.—The Guildhall, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. "The Economical Utilization of Electricity in Great Britain," by R. B. Giles.

Friday, 10th December

LONDON.—At the Royal Society of Arts, John Adam Street, Adelphi, W.C.2, 6.30 p.m. Junior Institution of Engineers. Inaugural meeting of 68th session. Presentation of awards and induction of Sir Noel Ashbridge as President. Presidential address on "New Developments in Broadcasting."

Savoy Hotel, W.C.2, 6.30 for 7 p.m. Association of Electrical Machinery Traders. Annual dinner-dance.

Caxton Hall, S.W.1, 6.30 p.m. E.P.E.A. (Southern Meter Engineers' Group). "Telemetering," by H. Horwood.

NEWCASTLE-ON-TYNE. — King's College, 7 p.m. I.E.E. North-Eastern Students' Section. Technical film show.

STOKE-ON-TRENT. — Electricity Showrooms, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "The Lightning Protection of High-Voltage Transmission and Distribution Systems," by H. M. Lacey.

German Patent Developments

Resuscitation of System

By S. T. MADELY

TWO things of importance to those interested in German patents have recently occurred. One is the resumption of patent relations with Germany. The other is the publication of German patent specifications.

With regard to the first item, a Filing Office was opened at Darmstadt on 1st October for the purpose of enabling aspiring patentees to lodge their applications. This office does not undertake any examination work or searching or anything of that sort. Before this can be done it will be necessary to assemble a properly trained staff of examiners. How long that will take remains to be seen: the present time would scarcely seem to be propitious. It must also be remembered that the original Patent Office was situated in Berlin, where naturally the records necessary to efficient patent examination must also be kept.

Question of Dating

Whatever the future may hold, on 1st October German patent attorneys who had previously been receiving from their correspondents abroad patent applications for filing proceeded to do so, claiming, where so instructed, the basic Convention date for the foreign case. When this will be allowed is not known. For the present the most that is allowed is the date above mentioned for those filed on or before 1st October, and the actual filing date for those lodged later.

The Board of Trade issued Orders under the Trading with the Enemy Act, 1939, which enabled this procedure to be followed. The Orders in question were Statutory Instruments 1948 Nos. 2086, 2087, and 2088. The effect of these Orders was to render permissible the filing of applications in Germany for the grant of patents, and the registration of designs and trade marks; to allow subsequent dealings in patents, designs and trade marks arising out of these applications; and to remove from the control of the Board of Trade or of the Custodian such moneys as accrue from such transactions.

It is officially intimated that applications of this kind should be made through German patent attorneys. But the revised Instruction No. 9 of the Joint Export-Import Agency must be followed in arranging for the services of the attorneys and for the payment of their fees. One of the provisions is that all contracts or agreements relating thereto must eventually be in writing; that is to say, if they start by conversation, for example, that must be later confirmed in writing. Although the Joint Export-Import Agency does not require the prior submission to it of these agreements, they must all contain or observe certain conditions, namely, that payment must be made by the foreign principal within fifteen days after presentation of the invoice and be in the approved currency of payment which is the rate of 30 U.S. cents to the Deutsche mark, on a basis of either commission or fixed fee.

Ten Deutsche marks must be paid with each application to the Filing Office. So far as United Kingdom applicants are concerned it is understood that it will be sufficient if an undertaking is given by the applicant or his agent to make the payment to the Filing Office as soon as it is practicable.

Inspection of Specifications

We will now proceed to the second item. No fewer than 146,000 unpublished German specifications of application lodged by enemy nationals in the German Patent Office have been microfilmed and were to be available for public inspection in the Patent Office Library in London on 1st November. This film is divided into 100-ft. lengths, each reel relating to one or more classes of subject-matter. German Class 21 deals with electrical engineering, and contains 26,445 specifications.

In order to facilitate examination of these specifications volumes of summaries have been prepared in the German Patent

Office. Books Nos. 2, 3, 4, and 5 contain respectively Volumes I, II, III, and IV of Electrotechnics (Elektroteknik). These books are on sale at 21s. per volume at the Patent Office Sales Branch, London. Permission to inspect the film may be obtained from the Patent Office Librarian. If there is a sufficient demand contact prints or quarter-plate photographic enlargements will be supplied at a later date.

Whatever charge is necessary will also be fixed later. It should be added that printed specifications of German Patent and a classified index up to and including 1945 are now available in the Patent Office Library, although incomplete.

As a matter of interest the volumes of summaries mentioned above are part of a series of 22 volumes dealing with all branches of subject-matter, of which the first fifteen are available. The remainder have been held up owing to the present situation in Berlin.

As patent applications emanating from Germany can now be filed in this country, and as correspondence is being revived with German patent agents, it is to be hoped that patent relations between the two countries will now stand on an ever-improving basis. The world cannot be deprived for a lengthy period of the wealth of inventive gift there is in Germany without suffering irreparable loss.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1942

SPERRY Gyroscope Co., Inc.—"High-frequency electron-discharge tube structures. 9243. 31st October, 1941. (612404.)

1943

A. L. Cianchi,—"Electrical switches having mercury contacts." 5876. 12th April, 1943. (Cognate application 7119/43.) (612305.)

Sperry Gyroscope Co., Inc.—"Apparatus for controlling the passage of high-frequency energy across a joint between two conductors." 9381. 27th May, 1942. (Cognate applications 9382/43 and 9383/43.) (612405.) "Energy coupling devices for transferring high-frequency energy." 9793. 18th June, 1942. (612406.) "Impedance transformers." 10471. 29th June, 1942. (612407.)

1944

Sperry Gyroscope Co., Inc.—"Ultra-high-frequency apparatus for interchanging energy between a concentric transmission line and a circular wave guide." 6068. 2nd April, 1943. (612409.) "Ultra-high-frequency wave guides. 7746. 8th April, 1943. (612410.) "Control systems." 18689. 29th May, 1943. (612307.)

1945

Marconi's Wireless Telegraph Co., Ltd.—"Magnetron electron-discharge devices. 7892. 29th March, 1944. (612415.) "Magnetron electron-discharge devices and associated circuits." 15905. 17th November, 1943. (612513.) "Cathode-ray deflecting circuit." 31408. 25th July, 1944. (612118.)

Igranic Electric Co., Ltd.—"Non-free-tripping overload circuit-breakers." 11720. 10th May, 1944. (612110.)

B. A. Cocker, R. Harrison and I. H. Harding.—"Mechanism for automatic adjustment, to preselected settings, of movable elements, such as tunable components in radio and like electrical circuits." 17639. 10th July, 1945. (612315.)

General Electric Co., Ltd., and E. P. Fairbairn.—"Apparatus for the automatic tuning of electric circuits." 18431. 18th July, 1945. (612316.)

Philco Radio & Television Corporation.—"D.c. amplifiers and signal maintaining circuits associated therewith." 30387. 1st September, 1944. (612117.) "Electrical signalling system." 31812. 1st September, 1944. (612119.)

1946

General Electric Co., Ltd., and E. Friedlander.—"Constant voltage transformers." 2525. 25th January, 1946. (612430.)

Standard Telephones & Cables, Ltd.—"Temperature controlled crystal holder." 3266. 9th February, 1945. (612524.)

G. T. Davies.—"Cathode-ray tubes." 6819. 5th March, 1946. (612434.)

British Thomson-Houston Co., Ltd.—"Directional aerials." 6995. 27th March, 1943. (612329.)

Kodak, Ltd., H. M. Ross and A. L. Shuffrey.—"Electrical measuring instrument." 7346. 8th March, 1946. (612330.)

British Thomson-Houston Co., Ltd., and R. Keitley.—"Measuring circuits for a.c. voltages." 10568. 5th April, 1946. (612333.)

Philips Lamps, Ltd.—"Electric resistances." 11010. 22nd August, 1941. (612335.)

Westinghouse Brake & Signal Co., Ltd., and A. H. B. Walker. "Voltage regulating apparatus for alternating-current circuits." 12020. 18th April, 1946. (612442.)

Marconi's Wireless Telegraph Co., Ltd.—"Multiplex signalling system." 12095. 20th April, 1945. (612533.)

Du Mont Laboratories, Inc., A. B.—"Contact terminals for vacuum tubes and the process for sealing the terminals on the tubes." 13082. 2nd May, 1945. 612341.)

Marconi's Wireless Telegraph Co., Ltd.—"Oscillation generators." 13664. 5th May, 1945. (612444.)

P. W. Turner.—"Electric power supply equipment for use, for example, in vehicles." 13805. 7th May, 1946. (612342.)

Ever Ready Co. (Great Britain), Ltd., and N. Glaze.—"Electric torches." 13839. 7th May, 1946. (612537.)

Standard Telephones & Cables, Ltd.—"Pulse separator." 13902. 14th May, 1945. (612135.)

British Thomson-Houston Co., Ltd.—"Multiple electric motor actuator systems." 13916. 11th May, 1945. (612136.)

Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—"Valve volt-meters." 14021. 25th February, 1942. (612137.)

S. A. Sweet and D. F. Wilkinson.—"Electric signalling systems." 14439. 13th May, 1946. (612158.)

H. Willetts.—"Method of and means for installing electric wiring systems and the like." 14470. 14th May, 1946. (612162.)

Metropolitan-Vickers Electrical Co., Ltd., and T. F. Monoghan.—"Electrical resistance devices. 14531. 14th May, 1946. (612165.)

K. E. Bader.—"Time operated switches." 14583. 14th May, 1946. (612168.)

Philips Lamps, Ltd.—"Multivibrator circuits." 14698. 10th March, 1942. (612539.) "Devices for de-

termining a time integral of an electric current." 14701. 4th March, 1942. (612345.)

Igranic Electric Co., Ltd.—"Braking systems for induction motors." 14815. 24th May, 1945. (612177.)

Sanders & Co. (Wednesbury), Ltd., and E. B. Manion.—"Holders for electric lamps." 14898. 17th May, 1946. (612184.)

Westinghouse Brake & Signal Co., Ltd., and A. H. B. Walker.—"Apparatus for operating devices having a negative resistance characteristic from an alternating electric current supply circuit." 14960/1. 17th May, 1946. (612191/2.)

General Electric Co., Ltd., and W. Schiff.—"Electric switches employing a liquid conductor." 14987. 17th May, 1946. (612194.)

G. O. Rhys.—"Electric switches of the push type." 15017. 17th May, 1946. (612199.)

Marconi's Wireless Telegraph Co., Ltd.—"Reflected pulse vision systems. 15069. 17th November, 1944. (612348.)

J. E. I. Cairns.—"Electrical devices enclosed within evacuated or gas-tight envelopes." 15100. 18th May, 1946. (612349.)

D. A. G. Broad.—"Sealing of electrical conductors to vitreous seals." 15101. 18th May, 1946. (612212.)

J. Lucas, Ltd., and A. H. Ball.—"Electric cable couplings. 15103. 18th May, 1946. (612213.)

A. Roiseux.—"Lamp for producing ultra-violet rays." 15111. 23rd May, 1945. (612350.)

Wolseley Sheep Shearing Machine Co., Ltd., and H. J. Macnamara.—"Electrically operated hair clippers." 15138. 20th May, 1946. (612352.)

Etablissements Merlin & Gerin.—"Circuits and apparatus for indirect testing processes, to determine the making and breaking capacity of electric switches and circuit-breakers." 15154. 3rd February, 1943. (612219.)

Standard Telephones & Cables, Ltd., R. M. Barnard and E. Wooltorton.—"Electrical condensers." 15182. 20th May, 1946. (612221.)

Hoover, Ltd.—"Suction cleaners." 15190. 13th June, 1945. (Cognate application 15191/46.) (612223.)

Molins Machine Co., Ltd., and E. A. Chandler.—"Thermo-control arrangements for electric circuits." 15208. 20th May, 1946. (612356.)

British Thomson-Houston Co., Ltd.—"Apparatus for balancing rotors." 15213. 23rd May, 1945. (612357.)

General Electric Co., Ltd., E. Gallizia and W. G. Thompson.—"Protective arrangements for electric supply systems." 15220. 20th May, 1946. (612228.)

R. Hofgaard.—"Electric relays." 15239. 20th May, 1946. (612232.)

Marconi's Wireless Telegraph Co., Ltd.—"Radio antennas." 15304. 27th January, 1945. (Cognate application 15305/46.) (612359.)

Standard Telephone & Cables, Ltd., and B. B. Jacobsen.—"Electric fault alarm circuits." 15353. 21st May, 1946. (612362.)

Standard Telephones & Cables Ltd., and J. L. Ashford.—"Electric welding equipment." 15354. 21st May, 1946. (612242.)

Metropolitan-Vickers Electrical Co., Ltd., and G. J. Scoles.—"Time base circuits for cathode-ray tubes." 15370. 21st May, 1946. (612244.)

Metropolitan-Vickers Electrical Co., Ltd., H. Whalley and G. Shand.—"D.c. transmission systems of the step-by-step type." 15371. 21st May, 1946. (612245.)

Western Electric Co., Inc.—"Wipers for contacting with bank terminals in electrical switches and an improved method of manufacturing such wipers." 15415. 20th December, 1943. (612251.)

H. E. Bayliss.—"Electric resistances." 15468. 22nd May, 1946. (612262.) "Variable electric resistances, potentiometers, and the like." 15469. 22nd May, 1946. (612263.)

Landis & Gyr Soc. Anon.—"Device for damping humming noises in electricity meters." 15506. 2nd June, 1945. (Addition to 508642.) (612267.)

C. H. Parsons, Ltd., and G. B. Handley.—"Electric plug-and-socket connectors." 15573. 22nd May, 1946. 612275.

British Insulated Callender's Cables, Ltd., D. C. Hancock and D. T. Hollingsworth.—"Electrical insulating compound." 15700. 23rd May, 1946. (612302.)

Akt.-Ges Kummler & Matter.—"Conductor wire suspension systems for electric traction." 15711. 12th January, 1946. (612449.) "Trolley wire systems for electric tracks." 15712. 22nd February, 1943. (612450.)

Smart & Brown (Engineers), Ltd., W. H. Spivey and B. Stevens.—"Mounting of electrical accessories on walls." 15717. 23rd May, 1946. (Cognate application 32332/46.) (612451.)

General Motors Corporation.—"Electric motor driven screw-and-nut mechanism." 15755. 26th May, 1945. (612462.)

Standard Telephones & Cables, Ltd.—"Electron-discharge devices. 15820. 28th May, 1945. (612470.) "Rectifier element and lead assemblies." 15821. 21st June, 1945. (612471.)

British Thomson-Houston Co., Ltd.—"Direction indicators." 15830. 25th May, 1945. (612388.) "Interstage coupling circuits for thermionic valve amplifiers." 15831. 26th May, 1945. 612472.)

A. B. Du Mont Laboratories, Inc.—"Electrical connectors for vacuum tubes." 15842. 26th June, 1945. (612391.)

Sadir-Carpentier.—"Radio telecontrol systems." 15884. 3rd December, 1943. (612398.)

H. Sonnenfeld.—"Electric power cable." 15892. 25th May, 1946. (612482.)

J. A. Crabtree & Co., Ltd., J. A. Crabtree and R. W. Morgan.—"Shielded electric sockets." 15925. 25th May, 1946. (612486.)

E. Renard.—"High-frequency coils and transformers." 15977. 25th September, 1945. (612543.)

Line Equipment, Ltd., and R. E. Cranston.—"Electric contacts." 16002. 27th May, 1946. (612547)

Philips Lamps, Ltd.—"Electric incandescent lamps and discharge tubes." 16012. 7th March, 1942. (612551.) "Electrical contact lips." 16016. 18th March, 1942. (612552.)

Radio Corporation of America.—"Heavy-current transformer apparatus." 16030. 26th June, 1945. (612556.)

Electric Construction Co., Ltd., and J. C. Milne.—"Supply equipment for electric arcs." 16057. 27th May, 1946. (612562.)

Philips Lamps, Ltd.—"Electric-discharge tubes." 16235. 16th January, 1940. (612581.)

Marconi's Wireless Telegraph Co., Ltd.—"Receivers for angle-modulated carrier waves." 16280. 29th May, 1945. (612585.)

S. G. Brown, Ltd., F. W. J. Gale and T. D. Ibbotson.—"Rheostats." 16319. 29th May, 1946. (612587.)

Ateliers de Constructions Electriques de Charleroi.—"Air-cooled mercury vapour current convertors." 16362. 11th July, 1945. (612593.) "High-power mercury vapour current convertor with metal tank." 16363. 19th July, 1945. (612594.)

Amended Specifications

G. H. Scholes & Co., Ltd., and ors.—"Electric tumbler switches." 513,054.

British Thomson-Houston Co., Ltd.—"Magnetic recording heads." 602427.

Economic Conditions in Canada

A REPORT on "Economic and Commercial Conditions in Canada," has been prepared by Mr. R. Keith Jopson, Deputy Senior Trade Commissioner in Canada, and published for the Export Promotion Department, Board of Trade, by H.M. Stationery Office at 3s net. This includes a chapter relating to the production of electrical apparatus in Canada, based on the 1945 census of production with tentative figures of production of domestic electrical appliances for 1946. Indication is given of the possibilities of the Canadian market. There is also a section dealing with water-power development with figures of the capacity of the generating installations in each province at 1st January, 1947.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Argentina.—CORDOBA.—20th December. Aerotechnical Institute. Supply of 8,000 kVA transformer sub-station. (E.P.D. 43410/48. Com./1450.)*

Australia.—BRISBANE.—3rd February. City Electric Light Co., Ltd. Twenty 500-kV indoor, oil-cooled, three-phase transformers. (E.P.D. 43556/48. TEN/8/I.D.I.)

Belfast.—10th December. Electricity Department. Electric hoist-blocks and jib-crane for Harbour power station. (26th November.)

Dagenham.—8th January. Borough Council. Electric lamps and supplies (Schedule No. 35), for one year from 1st April, 1949. K. Lauder, Town Clerk, Civic Centre.

East Ham.—13th December. Borough Council. Electric lighting and heating installations at the Gainsborough Community Centre, Dore Avenue. Borough engineer, Town Hall, East Ham, E.6.

Isle of Man.—9th December. Local Government Board. Electrical work in connection with the erection of fourteen houses at Janet's Corner estate, Castletown. J. Philips Lomas, architect, Martin's Bank Chambers, Victoria Street, Douglas.

Lanarkshire.—The County Council is shortly inviting tenders for sodium discharge lighting on the London-Carlisle-Glasgow-Inverness trunk road. Contractors wishing to be put on the list of contractors to whom specifications, etc., may be issued should communicate with the county lighting engineer. (See this issue.)

Newcastle-upon-Tyne.—City Council. Supply of ten miles of trolleybus wire.

Peterborough.—City Council. Electric lighting and power installations to permanent housing, Dogsthorpe/Newark estate. Forms of tender from the city engineer and surveyor, Town Hall, by 11th December. (See this issue.)

Poplar.—9th December. Borough Council. Electric lamps. (See this issue.)

South Africa.—CAPETOWN.—The City Electricity Department has extended the date for the receipt of tenders for transformers from 24th November to 5th January. (E.P.D. 41973/48. Com./1155A.)*

JOHANNESBURG.—3rd February. Railways and Harbours. Telegraph line material. (Tender No. 8199.) Chief stores superintendent, S.A.R., Park Chambers, Rissik Street.

Warwickshire.—Firms wishing to have their names placed upon the County Council's list of approved contractors for heating, hot and cold water supplies, steam services, electric lighting and power installations, etc., should apply to the county architect by 21st February next. (See this issue.)

*Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

Chelsea.—Borough Council. Recommended. Installation of fluorescent lighting in large hall at the Chenil Galleries (£277).—Courtney Pope (Electrical), Ltd.

Luton.—Corporation. Accepted. Electrical installations at the Riddy Lane county secondary school (£5,069).—David Thomson & Sons, Ltd.

Northumberland. — Education Committee. Accepted. Electrical installation at the Berwick St. Cuthbert's R.C. School (£81).—Border Electrical Service. Installation of new cable at the Alnwick Duke School (£119).—I. & E. Morton. Electric radiators for Berwick Bell Tower C.M. School (£187).—South-East Scotland Electricity Board. Loudspeaker equipment at Monkseaton School (£177).—Devereaux Moodie & Co.

Southport.—Corporation. Accepted. Electrical wiring and fittings at new Publicity and Attractions Offices (£343).—Butterworth & Robinson.

Tynemouth.—Town Council. Accepted. Installation of electricity at groups of 80 and 50 houses in Lynn Road and 50 houses in the Marden neighbourhood unit.—C. N. Whitfield.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alnwick.—Electrical work in connection with the adaptation of premises as offices; U.D.C. surveyor.

Conversions at premises for creamery (£40,000); C.W.S. Architects' Department, 90, Westmorland Road, Newcastle-on-Tyne.

Barrow-in-Furness.—Houses (123), Newbarns South site; borough engineer.

Bath.—Junior school, Southdown; Alfred J. Taylor & Partners, architects, 4/5, Bridge Street.

Houses (95), Weston site; city engineer.

Bebington.—Factory, Bromborough Port industrial estate, for White, Child & Beney, London; A. E. Shennan, architect, 17, North John Street, Liverpool.

Blackburn.—Civic Restaurant, Town Hall, and day nurseries on three sites (£24,178); W. Pickstone, borough engineer, Town Hall.

Bolton.—Extensions to factory, Sylvester Street, for Knowles, Ltd.; Bradshaw, Gass & Hope, architects, 19, Silverwell Street.

Bournemouth.—Erection of buildings on site of Metropole Hotel; Levy & Franks, 17, Gordon Square, London, W.C.1.

Block of flats, Tucton Road; Reynolds, Tomlin & Dexter, architects, Granville Chambers.

Canvey Island.—Extensions to Long Road school (£33,500); Essex county architect, Chelmsford.

Cheadle and Gatley.—Public hall for U.D.C.; G. P. S. Stanley, surveyor, Council Offices, Bruntwood Hall, Cheadle, Ches.

Chesham.—Pumping station and staff cottages, Hawridge, for Bucks Water Board; R. C. White, architect, Ceely House, Church Street, Aylesbury.

Crewe.—Block of buildings and concert hall for L.M.S. Sports and Welfare Institute (£18,000); T. Gresty & Sons, builders, Willaston, Crewe.

Dudley.—Office block; John Thompson (Dudley), Ltd., Windmill Engineering Works.

Egham.—Houses (44), Ripley Spring estate; surveyor, Fire Station Buildings, High Street, Egham, Surrey.

Gateshead.—Electrical installations in kitchens and dining rooms at the Shipcote and King Edward Schools; H. J. Cook, chief architect.

Glasgow.—Buildings for Royal Infirmary; Wylie, Shanks & Wylie, architects, 204, West Regent Street.

Extensions to works; Croft Bodybuilding & Engineering Co., Ltd., Gallowgate.

Highgate.—Block of 22 flats, Archway Road; Hornsey Housing Trust, Ltd., 5, Haringey Park, N.8.

Hyde.—Textile finishing and printing dept., Newton Bank Printworks; Calico Printers' Association, Ltd., St. James' Buildings, Oxford Street, Manchester.

Ince-in-Makerfield.—Houses (40), Petticoat Lane site, for U.D.C. (£46,237); J. Gaffney & Son, builders, 277, Whelley, Wigan.

Jarrow-on-Tyne. — Additions to works (£10,000) for the Neuchatel Asphalt Co., Ltd., Grey Street, Newcastle-on-Tyne.

Keighley.—Day nurseries at Ingrow and Haworth; E. G. Felgate, borough architect, 26, College Street.

Lancashire.—Eleven colleges for further education and 48 county colleges; G. Noel Hill, county architect, County Offices, Preston.

Leicestershire.—Police wireless station, Bardon Hill; county architect, Leicester.

Luton.—Primary school, Ashcroft Road; borough engineer.

Large extensions to works; Vauxhall Motors, Ltd., Eaton Green Road.

Macclesfield.—Primary school, Broken Cross, and secondary school, Siddington; E. M. Parkes, county architect, The Castle, Chester.

Manchester.—Reinstatement after war damage of Victoria and Exchange stations for British Railways Executive (£200,000); W. H. Hamlyn, chief architect, British Railways, Watford, Herts.

Morley.—Permanent houses (80), Albert Road and Garden House Lane estates; M. H. Brook, housing director, Queen Street.

Newcastle-on-Tyne.—Brass rolling shop and an extrusion shop for Vickers, Armstrongs, Ltd.; R. T. James & Partners, St. Nicholas Buildings.

Electrical installation at Laing Art Gallery; R. T. Cook, city property surveyor, Town Hall.

Newport (Isle of Wight).—Houses (34) and flats (20), Pan estate, for T.C.; Ernest L. Smith & Son, architects, 4, High Street, Sandown.

Northants.—Eight county colleges; A. N. Harris, county architect, County Hall, Northampton.

Northwich.—New works; Imperial Chemical Industries, Ltd., Alkali Division, Winnington, Northwich.

Ryton-on-Tyne.—Electrical installations in 24 houses at Greenside; surveyor to Urban District Council.

Salford.—Branch library, Cromwell Road, Pendlebury, and four district colleges; W. A. Walker, city engineer, Town Hall.

Reinstatement after war damage and extensions to Town Hall and Magistrates' Courts (£30,000); Moston Brick & Building Co., Ltd., Kenyon Lane, Moston, Manchester, 10.

South Shields.—Ice-cream factory, Back Ogle Terrace, for Minchella & Co., Ltd.; Page, Son & Hill, architects, 75, King Street.

School kitchens and dining rooms at the Mortimer Road County School; F. W. Newby, architect, 41, Harton Grove, South Shields.

Stockport.—Additional operating theatre at Stepping Hill Hospital; H. S. Fairhurst & Son, architects, 55, Brown Street, Manchester, 2.

Surbiton.—Flats (72), Ripon Gardens and Woodgate Avenue; borough surveyor.

Swansea.—Rebuilding office, etc., premises, 30/34, Castle Street; Henry A. Ellis & Son, architects, 6, Wind Street.

Tonbridge.—Houses (48), Brook Street estate, for U.D.C.; engineer and surveyor, Tonbridge Castle.

Twickenham.—Rebuilding factory, Richmond Bridge Works; Reliance Nameplates, Ltd.

Winchester.—Houses (82), Stanmore site; H. S. Sawyer, architect, Queen Anne Chambers, High Street.

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 24th November:—

WINGARD (design). No. B667,938. Class 7. Dynamo belts, dynamo brushes, electric ignition devices for internal combustion engines, etc. No. B667,939. Class 9. Accumulators and boxes therefor included in Class 9, battery terminals, cells of accumulator batteries, commutators, electric door openers, electric footwarmers, electric soldering irons, electric fuses, junction boxes for the lighting of vehicles, voltmeters, wireless aerial masts, etc. No. B656,858. Class 11. Heating appliances, reflectors, reversing lights and spotlights, all for use in cars; and lamps for the interior of cars, etc.—M. A. Wingard, Ltd., Kingsham Road, Chichester.

RADIOMILE. No. 660,461. Class 9. Wireless, television, telegraphic and telephonic instruments and apparatus and parts thereof included in Class 9.—Radiomobile, Ltd., Cricklewood Works, Edgware Road, London, N.W.2.

VAMPIRE. No. 663,983. Class 9. Electrically operated measuring instruments.—Everett, Edgcumbe & Co., Ltd., Colindale Works, Colindeep Lane, Hendon, London, N.W.9.

BEAUTYVAC. No. B666,352. Class 10. Medical vacuum electrical equipment for stimulating the blood circulation.—G. W. Willoughby, 14, Park Square, Regents Park, London, N.W.1.

MAGNARC. No. B655,742. Class 11. Arc lamps and parts thereof and fittings therefor, all included in Class 11.—J. E. McAuley Mfg. Co., 552-554 West Adams Street, Chicago, Illinois, U.S.A. Address for service, c/o Stevens, Langner, Parry & Rollinson 5-9, Quality Court, Chancery Lane, London, W.C.2.